

THE COSMETIC BIFOCAL

BY

NEWTON K. WESLEY, O. D.

Chicago - U.S.A.

The principle of the pinhole lens as a method of aiding the presbyopic patient has laid dormant in the mind of the contact lens industry for sometime. In 1932 Herr Zillig who as a student at the Zeiss School of Jena, conceived the idea of a contact lens which was made of an opaque periphery and a small clear central area which acted as a pinhole aperture. Zillig reported that the lens eliminated the use of accommodation for ordinary activities at any distance, and gave a wide field of vision¹. The advantage of the pinhole aids the presbyopic patient by virtue of the fact that the depth of focus is increased to the point that near vision is possible without the addition of power for near vision.

Perhaps this principle was overlooked in the thinking of the manufacturers in the contact lens field, or due to the difficulties in manufacturing such a lens. was early abandoned as a possible solution to the presbyopic problem.

As the pupil size is made smaller in a contact lens, the depth of focus is increased. In order to accomplish this principle in a contact lens, the pupil size has to be incorporated in the form of a cosmetic contact lens. With early experimentation, the practitioner found that the peripheral field was eliminated to a great extent and the patient was restricted to a visual field of approximately 60 degrees.

These early problems offset the advantage of the pinhole lens application to the presbyope and led to various other attempts to solve the presbyopic problem with corneal bifocal lenses.

1. Freeman, H: The Letters to the Editor: The Optician, June 23, 1950.

The Bicon is an annular type of bifocal which has one zone for near power and second zone for distance on the outside surface of the lens. The two distinct curves are of different radii on the outside surface. Surrounding the central zone containing the distance Rx is the annular zone for the near Rx.

At the same time that the Bicon was developed in the United States, de Carle introduced a bifocal which was an annular type for near power and a second zone for distance; only the curves for the different radii were ground on the inside of the lens. The de Carle bifocal lens uses the difference in index of refraction between the plastic and pre-corneal fluids to achieve the desired difference for near.

Later the British Bifocal was developed which was combination of the Bicon and the de Carle essentially being manufactured as a de Carle, with additional power placed on the outside periphery of the lens for near vision.

The C. J. Black Fused and Cinefro bifocal were attempts to manufacture bifocal similar to spectacles. The C. J. Black was ground as a one piece lens and looks like an "Ultex" only being ground on the outside surface, while the fused is a two piece bifocal and resembles a "Kryptok" lens.

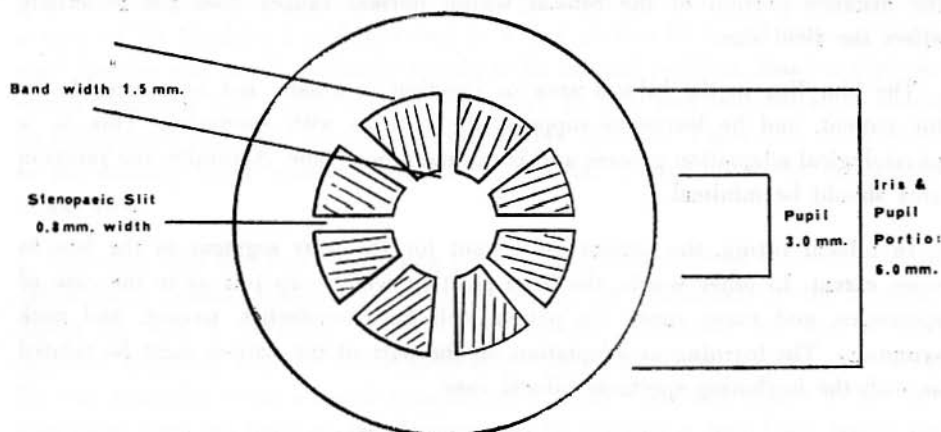
The fused bifocal lens is very popular today and is manufactured with plastic of two different indices.

The piggy back bifocal is comprised of two separate lenses. The standard single vision lens is first fit for distance, and then later a second lens is constructed with the necessary power for the add, and with the base curve of the second lens paralleling the outside surface of the single vision lens. The add power lens is then cemented into place on the front surface at the correct position for near vision. The piggy back in practice has not been a successful bifocal application.

The two color bifocal used spectral wave lengths to cause a chromatic power differential for patients with a low add. The dual color lens is a single vision lens which acts like a bifocal by taking advantage of certain colors to focus before other colors. For instance, a yellow color would be used in the center distance portion of the lens, and this would be surrounded by an annular ring of blue plastic. In this manner, the patient could tell whether he was looking through the distance or near point of the lens. The two color bifocal has an approximate add of from 1.25 to 2.00 diopters, depending on the combination of colors used.

Trifocal lenses also have been manufactured. The principle of continuous vision is also used in the multifocus lens. Today, for the most part, the Bicon, the de Carle, and the Fused Bifocal are prescribed by the majority of practitioners.

THE COSMETIC BIFOCAL



Example of Cosmetic Bifocal Configuration which is Subject to Variation Through Further Research

If the single vision lens position upwards, the Bicon or de Carle most likely will give the best results. If the single vision lens positions downwards, the fused bifocal is recommended; however, to a great extent, the type of bifocal used is a matter of choice by the practitioner.

All present types of bifocal contact lenses require great skill in centering. All patients who are fit with single vision contact lenses first, should be viewed from the standpoint of good centering and positioning of the lens.

The problems associated with the fitting of various types of bifocal contact lenses described resulted in the creation of the cosmetic bifocal. In the use of the pinhole, the visual field is restricted to about 60 degrees, but with the cosmetic bifocal this restriction is eliminated.

By taking a page from the Eskimo's history with slit lenses, the cosmetic bifocal has 8 mm. slits placed in horizontal, vertical, and oblique meridians to give an almost normal field of view.

The practitioner must first consider the symptoms that are normally expected in the fitting of the bifocal lenses. The bifocal is the same as the single vision lens in that there are normal adaptive symptoms as well as "true" symptoms for which an adjustment can be made.

In fitting bifocals, the size of the field must be considered. Just as the normal changes of the pupil size does not affect the field of vision noticeably, altering

the distance portion of the bifocal within normal ranges does not materially affect the field size.

The blur line in the bifocal area or junction is usually not as noticeable by the patient, and he learns to suppress the blur as with spectacles. This is a physiological adaptation process and is normally overcome. Naturally, the junction area should be minimal.

In bifocal fitting, the patient must hunt for the near segment in the lens to some extent. In other words, the head position will be up just as in the case of spectacles, and many times the patient will have headaches, nausea, and neck symptoms. The learning or adaptation on the part of the patient must be related as with the beginning spectacle bifocal case.

Lens movement should be kept minimal in the fitting of a bifocal contact lens with no affect on wearing time, as circulation of tears must remain unimpeded. With each blink, the lens must remain as stationary as possible. In a spectacle lens with a decentration of 3.0 mm., the equivalent drop in a contact lens is equal to 1.0 mm. at the plane of the cornea.

If a patient has trouble with his reading distance, the bifocal is either too low, the power is not correct, or the junction creates a blur area. The use of Lumicon R markings greatly aids the practitioner to observe the centering and position of the lens on the eye in a normal as well as downward gaze.

One of the disadvantages in the Bicon was the junction blur which has caused considerable complaints by patients and can lead to non-wearing. Use of the fused bifocal has helped to eliminate this problem. In the fused bifocal, plastic of two different indices are fused together, creating a sharp demarkation between the segments and has eliminated most of the objectionable blur area junctions of the Bicon.

The best method of fitting bifocal contact lenses is to first start with the single vision first, then advance to the bifocal. For this reason, many patients adapt faster to bifocals after having worn single vision lenses. In our research clinic, best results have been achieved with patients who use single vision contacts as a prelude to the fitting of bifocal contacts. In most successful bifocal cases, the pupil is encroached by the segment, and the pupil line is not seen by the patient in a normal position. The tear layer should be a calculated minimum as an unevenness causes flare and induced prismatic effect, and minimal movement should be the desired goal in the bifocal fitting case.

THE COSMETIC BIFOCAL

A good reason for learning to fit bifocal contacts, is in preparation for future generations of presbyopes. In the United States there are approximately 58 million people age of 45 or over who are potential bifocal contact lens cases. The practitioner should "keep his hand in it" and continue to fit a number of patients so that there will be no doubt that bifocal fitting can be successful. The experience gained from the continued fitting of bifocal lenses allows the practitioner to observe a repetition of the same factors over and over, thereby gaining an insight to the problems as was the case in the early days of fitting single vision lenses.

With the knowledge and skills gained, the practitioner can be even more successful and establish a reputation for successful fitting of bifocal lenses. With proper screening of patients, an even higher ratio of success can be achieved by the practitioner.

Some practitioners solve the bifocal problem by fitting patients with one eye for distance and the other eye for near vision. This interference with binocular visual patterns should not be advocated.

Proper indoctrination and explanation to the patients should be the pre-requisite in the fitting procedure. The essentials for success in fitting bifocal contacts require proper lens fitting, centering and control of movement, plus the additional skill and knowledge of the practitioner.

The ability to control centering and movement is not as critical in the cosmetic bifocal. The cosmetic bifocal as described is actually an advancement of the pinhole bifocal lens. I have personally been wearing the cosmetic bifocal for some time and have found excellent results. I have also been delighted in the response from the presbyopic patients whom I have fitted with the cosmetic lens. Positioning and centering are no longer a major concern, although large areas of decentration are to be avoided. Generally, the patients remark "why didn't you use this type of bifocal in the first place?"

The practitioner can calculate the amount of concentration by the width of the cosmetic contact lens pupil. A cosmetic pupil size of 3.0 mm. would allow for a 1-1/2 maximum decentration although greater decentration could be tolerated because of the slits. This is in great contrast to the small amount of decentration permissible in line junction bifocals such as the Bicon, de Carle, and fused bifocals.

The color of the vehicle plastic can be manufactured in blue, brown, green, or grey in number one tints, although a clear lens is better for light transmission. The cosmetic lens has the added features of the bifocal lens and the Eskimo

slits for peripheral vision, and gives the patient adequate depth of vision, even though the lenses are not perfectly centered. Occasionally on extreme rotations, the patient may even be looking through the slit portion of the lens.

In order to create better transmission of light, clear plastic is advisable. The lenses are manufactured with the center cosmetic portion outside of the pupillary area and can be either .75 mm. or 1.5 mm. wide. The 1.5 mm. width of the opaque section has approximately the effect of a number 1-1/2 tint visually. The .75 mm. opaque portion has the visual effect of a clear lens.

Many variations are possible in the position of the slits and in the size, shape or number of slits present in the cosmetic bifocal. Clinic research is still being conducted in this area.

The basic advantage of the cosmetic bifocal is that centering does not have to be as exacting, and that there is no particular image jump. A patient can read with the lens at the normal head position, instead of head tilting, and there is no need for prism or truncation in the manufacture of the lens as the fitting is simply the same as a single vision case. If needed, toric surfaces are possible on the front and back surfaces.

In some subnormal cases, the pinhole factor can increase the visual acuity of the patient, and increased acuity has been reported as well in keratoconus and irregular corneas.

In aphakia cases, the pinhole factor can well be taken advantage of, as the total plus power required will be less.

In the standard presbyopic case, the pinhole factor can also be utilized in that the plus power can be "pushed" slightly on the patient with no effect at distance and increased benefits at near point. Many times, it has been found that the increased plus is not necessary.

A great deal of clinical research still has to be done on the cosmetic bifocal but early clinical research indicates that the cosmetic bifocal works for it combines two elementary principles - the pinhole and the Eskimo slits to provide the contact lens practitioner with a real practical bifocal with great future possibilities.

18 South Michigan Avenue.