Contact Lens Update
CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

Multifocal Contact Lens Fitting: Clinical Pearls

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With an aging population[1], the number of presbyopic patients who require vision correction is increasing. It is estimated that there will be approximately 2.1 billion presbyopes worldwide by 2030.[2] This presents clinicians with a multitude of opportunities to provide their patients a suitable form of vision correction.

Interestingly for presbyopic patients, this solution rarely involves correction with contact lenses (CL). One study out of the UK reported that only one out of nine presbyopic patients that attended an eye exam between 2014-2016 used contact lenses as their main form of vision correction. In other words, eight out of nine patients used some kind of spectacle correction.[3] More specifically, when considering the 57 contact lens wearers (out of 529 total surveyed presbyopes), only 15 (2.8%) were using multifocal (MF) contact lenses! [3]

Surprised? Don't be.

In their review of global contact lens prescribing trends over the years 2000 to 2020, Morgan and Efron reported that, although there was an increase in MF CL fits, distance CLs supplemented by reading glasses for near work are still the predominant CL modality for presbyopic patients.[4] While many patients do not seem to be aware that a MF CL option for correcting presbyopia even exists,[5, 6] many practitioners hesitate to offer or fit them due to a combination of lack of fitting skills, a presumption of longer chair time and the requirement for multiple fitting trials, and the unavailability of a "perfect" MF CL that performs well visually, while also being comfortable.[4-6]

Contrary to the above misconceptions, manufacturers have introduced many new and exciting MF CL options that can provide good vision and comfort. Furthermore, the availability of fitting guides as well as online calculators to aid in lens selection can reduce the number of fitting attempts and thereby provide clinicians with the tools needed for success.

In this editorial, we will review the components of MF CL fitting that should be considered to achieve this success.

The Patient

When fitting MF CLs, always start with a consideration of the patient's needs. Much of the eventual success with MF CL depends on the patient and their motivation to try these lenses, and on the ability of the clinician to translate the available information, be it clinical (e.g. prescription or pupil size) or patient-related (visual needs of each patient). Rather than waiting for patients to ask about these lenses, being proactive about their use is a crucial first step.[7] This specifically applies when discussing potential solutions for vision correction with patients approaching presbyopia, or to those presbyopes who spend significant time in front of computer screens or performing near tasks.[7, 8]

A clinician's ability to identify the patient's needs is also an important part of the fitting process. This not only comes down to asking the right questions, but also to drawing the correct conclusions based on feedback. It has been recommended to begin the process by allowing the patient to speak about their history, experience and visual needs without interruption, and then follow up with more specific questions as required.[9] These follow-up questions should focus on previous CL wear experience, reasons for discontinuing CL wear (if applicable), at which distance(s) clear vision is most crucial, occupation and hobbies, general and ocular medical history, and medication use.[5, 7, 9, 10]

Patient age and previous experience with CLs are crucial factors to consider when counselling your presbyopic patients. Those with previous lens wear experience may be more successful candidates for MF CL wear than neophytes, who, in addition to the visual adaptation challenges to MF CL designs that apply to all wearers, will also need to learn the basics of lens wear. That said, older presbyopes, who require a greater near add, may be more motivated to trial a MF CL than emerging presbyopes, whose near vision may still allow them to accomplish most routine daily tasks.[4, 8]

The Refraction

The clinical examination should begin with a sphero-cylindrical refraction, aiming to maximize distance plus, and an evaluation of binocular vision status.[5, 11-14] Care should be taken if astigmatic patients are to be fitted with MF CLs; uncorrected astigmatism has been reported to impact MF lens fit success rates, as residual astigmatism negatively affects visual performance in patients whose dominant eye is astigmatic, whose astigmatism is ≥0.75D, and in those with low spherical refractive error.[9] Accordingly, many MF CL fitting guides recommend using non-toric MF CLs only up to 0.75D or 1.00D of astigmatism,[11, 12] while patients with greater levels of astigmatism should always be fitted with toric MF CLs.[7, 9, 10]

Determining Ocular Dominance

Ocular dominance is a vital component of MF CL fitting [5, 7, 9, 10] and is a required variable in most fitting guides and online calculators.[11-16] Knowledge of ocular dominance aids in initial MF CL selection, with the dominant eye typically being trialled with a "distance-friendly" prescription, while the non-dominant eye is optimized for near tasks.[11-16]

There are two main approaches to the testing of ocular dominance: the preferred sighting and the sensory (blur) tests.[5, 17] With the preferred sighting test, patients are initially asked to extend their arms in front of them, forming an aperture with their hands or by holding up a card with a hole cut out. They are then asked to focus on a distant target (e.g. letters on a VA chart) through the aperture; the dominant eye is the eye that continues to see the target while the fellow eye is closed/covered.[5, 17] The blur method is based on the introduction of a plus addition (typically +1.00D or +1.50D) in front of the manifest distance refraction.[5, 17] The plus lens is introduced in front of one eye, removed, and then introduced in front of the other eye, either while the patient views a distant target[17] or while they walk around the exam room.[5] The dominant eye is the one that the patient reports to be 'less comfortable' visually while being blurred.[5, 17]

While the preferred sighting method is more popular among clinicians,[5, 17] the blur method is often recommended by manufacturers in their fitting guides.[12-14] Pointer et al showed that there was only 50% agreement between ocular dominance findings when both methods were used (36 out of 72 participants), with the right eye being identified as dominant in a significantly greater number of participants with the preferred sighing vs the blur method (71% vs 54%). Without this clear consensus, following the guidelines of the associated MF fitting guide[11-14] is recommended.

Assessment of Ocular Health and Anatomy

When fitting MF CLs to presbyopic patients, ocular health does not deviate significantly from other CL types. Clinicians should focus on anatomical features including the horizontal visible iris diameter, vertical palpebral fissure and, most importantly, pupil size.[5] Because of the progressive reduction in tear volume with age, assessments of tear volume (e.g. tear meniscus height) and tear break-up time (TBUT) provide crucial information as to whether CLs are a suitable option for the presbyopic patient. Bennett has suggested that presbyopic patients with TBUTs of less than 5 seconds are less likely to be successful with MF CLs (see Figure 1).[5]

Pupil Size

Pupil size is directly related to positive outcomes in the MF CL fitting process,[5] as patients with pupil sizes between 3-5mm are more likely to have success compared to those with sizes outside of this range.[5, 18] Older presbyopes, who are known to experience a decrease in pupil size along with an increase in near add power with increasing age, may thus be more impacted as a result of the smaller useful optic zone of a MF lens.[19, 20]

With the above information in hand, appropriate patient expectations can be set and all potential vision correction modalities, including spectacle options, CL wear modalities and potential combinations thereof, discussed.[3, 5-7, 9] It is crucial for fitting success that patients are aware of the limitations and visual compromises of the various options for presbyopia, so that the most suitable correction modality can be selected by both the patient and practitioner. To help with this process, Bennett has summarized the most important considerations and factors when fitting CLs to presbyopic patients (see Figure 1).[5]

High probability for success
- Definite need for a visual correction
- Current contact lens wearer
- Tear BUT ≥ 10 seconds
- Good ocular health
- History of successful contact lens wear

Moderate probability for success
- Very low ametropia or emmetropia
- New wearer but motivated; aware of possible vision compromise
- Tear BUT between 6 and 9 seconds
- Large pupil size (>5 mm in room illumination): limits available choices for correction
- Low lower lid and/or flaccid lids: rules out segmented lens designs

Low probability for success
- New wearer with very low ametropia or emmetropia; unwilling to accept vision compromise
- Unrealistic expectations
- Tear BUT ≤ 5 seconds (repeated measurements) and/or PRTT ≤ 9 mm
- Poor hygiene
- Poor manual dexterity
- Irregular corneas

Figure 1: Important factors for presbyopic patient selection according to Bennett[5]

Multifocal Contact Lens Fitting

If a presbyopic patient is motivated to trial MF CLs and this aligns with their visual needs, the most suitable lens design and wear modality (soft vs rigid MF CLs, daily disposable vs reusable) requires consideration.

MF CL designs are divided into "simultaneous image" and "alternating image" designs.[10, 20] Alternating designs rely on a vertical movement of the lens, with the aim to have only one zone of the lens being positioned in front of the pupil at any time. Typically, alternating designs will have the distance zone located in the lens centre with the near zone inferiorly. A change in gaze from straight ahead to downwards results in the near zone moving in front of the pupil. Because of this required vertical motion, alternating image designs are almost exclusively available as rigid lenses.[10]

Soft MF CLs employ a simultaneous image design.[10] Simultaneous image designs require both distance and near zones to be positioned within the patient's pupil area at the same time, which is achieved by using either an aspheric or a concentric/annular lens design.[10, 20]

Aspheric designs show a gradual change of curvature on one of the two surfaces, with a much greater rate of flattening in comparison to single-vision aspheric CL designs.[10, 20] This results in two possible aspheric MF CL designs: centre distance or centre near. In centre distance designs, the lowest plus power is at the centre of the lens, with a gradual increase towards greater plus powers peripherally. Centre near lenses work the opposite way, with the strongest plus power in the centre, which then gradually transitions to lower powers towards the periphery.[10, 20]

Concentric or annular lens designs have an array of multiple concentric annuli or rings that alternate between distance or near (add) powers.[10, 20] The central annular zone is typically designed to cover approximately two-thirds to three-quarters of the patient's pupil size under normal room illumination. In most cases, annular MF CL designs contain the distance power in this central annular zone, with the near add in the surrounding annulus. Depending on the specific annular design, one or more additional annuli in alternating distance or near vision powers surround the two central annuli.[10, 20]

Modifications of annular or aspheric designs are now entering the market. One example is a recently introduced monthly replacement aspheric MF CL design that employs a decentered near add zone.[21] This lens design is intended for patients with smaller pupil sizes or older presbyopes (who are often found to have smaller pupils). In this design, the distance zone is in front of the pupil, while the near power is decentered inferior nasally in order to align with the naturally occurring convergence of the pupils during near tasks.[21]

An understanding of the optical design features for aspheric and annular MF CL designs is of great importance for the clinician, as it directly relates to anatomical features of the patient (e.g. pupil size) and thereby, can influence eventual MF CL fitting success. Patients with smaller pupils may only benefit from those lens powers that fall within their pupil boundaries, potentially limiting or fully eliminating certain lens power zones depending on the chosen MF CL design.[10, 20] Lens centration and movement are equally important when fitting MF CL designs – lenses that are decentered or that move a lot during eye movements or blinking are likely to negatively affect a patient's success with MF CLs.[10]

Use of Fitting Tools

Fitting guides have been developed by manufacturers following extensive clinical trials and take the potential limitations of a MF CL design into account. They are therefore definitive resources for choosing the most suitable trial lens.[7] While many clinicians still erroneously anticipate increased chair time and multiple fitting attempts as reasons to stay away from fitting MF CLs,[4, 6, 7, 22, 23] multiple studies have shown that successful fitting only

requires one or two trials per eye when the available tools, such as fitting guides or online calculators, are used.[22-25] When using the appropriate fitting guide and basic information like distance spectacle refraction, near add power and ocular dominance, initial lens fits were found to be successful (i.e. initial lens = final lens) in 74% to 83% of cases.[22, 23] Similarly, another study demonstrated that at a follow-up visit, no lens power change was needed for 90% of eyes when an online calculator was used to select the initial trial lens.[25]

Adaptation time

Many new 'things" need some getting used to, and this is no different for MF CLs. Following a few simple steps while trialling these lenses can increase the likelihood of eventual fitting success, including:[5, 7, 9, 10, 23]

- Allowing the lenses to stabilise for 15-20 minutes prior to assessing lens fit and performing an over-refraction
- Asking the patient to perform real-life tasks such as walking around the office, reading a magazine or using their smartphone rather than relying on visual acuity assessments
- Setting appropriate expectations by reminding patients that it may take some time to get used to their new lenses
- Ensuring that handling and vision are appropriate a few days after the patient leaves with the lenses, via a follow-up video or telephone call
- Following up after 14+ days to evaluate initial lens wear satisfaction and any problems
- Lastly, clinicians should not hesitate to make a prescription change if their patient is not quite convinced, but motivated to continue trying. Remember, good things take time.

Conclusion

Multifocal CL fitting has come a long way over the past decade, with new and advanced lens designs setting the stage for success. Clinicians can contribute to improving the quality of life of their presbyopic patients by asking the right questions, understanding the differences between MF CL designs, and using the appropriate resources such as fitting guides and online calculators.

REFERENCES:

1. United States Census Bureau. Nation Continues to Age as It Becomes More Diverse. Available at: https://www.census.gov/newsroom/press-releases/2022/population-estimates-characteristics.html Accessed: July 19, 2022.
2. Fricke TR, Tahhan N, Resnikoff S, *et al*. Global Prevalence of Presbyopia and Vision Impairment from Uncorrected Presbyopia: Systematic Review, Meta-Analysis, and Modelling. *Ophthalmology* 2018;125:1492-9.
3. Sivardeen A, McAlinden C, Wolffsohn JS. Presbyopic Correction Use and Its Impact on Quality of Vision Symptoms. *J Optom* 2020;13:29-34.
4. Morgan PB, Efron N. Global Contact Lens Prescribing 2000-2020. *Clin Exp Opt* 2022;105:298-312.
5. Bennett ES. Contact Lens Correction of Presbyopia. *Clin Exp Opt* 2008;91:265-78.
6. Morgan PB, Efron N, Woods CA. An International Survey of Contact Lens Prescribing for Presbyopia. *Clin Exp Opt* 2011;94:87-92.
7. Michaud L. Seven Steps to Success in Multifocal Fitting. Available at: https://www.reviewofoptometry.com/article/seven-steps-to-success-in-multifocal-fitting Accessed: 22-Nov-2022.
8. Rueff EM, Jones-Jordan LA, Bailey MD. A Randomised Clinical Trial of Multifocal Contact Lenses and Contact Lens Discomfort. *Ophthalmic Physiol Opt* 2021;41:93-104.
9. Quinn TG. A Logical Approach to Multifocal Lens Fitting. Contact Lens Spectrum;28:20-5. Available at: https://www.clspectrum.com/issues/2013/march-2013/a-logical-approach-to-multifocal-lens-fitting Accessed: 18-Nov-2022.

10. Bennett ES. 13 – Bifocal and Multifocal Contact Lenses. In: Phillips AJ, Speedwell L, eds. Contact Lenses (Sixth Edition). London: Elsevier; 2019:265-88.
11. Bausch & Lomb. Purevision 2 for Presbyopia Fitting Guide. Available at: https://pi.bausch.com/globalassets/pdf/PackageInserts/Vision-Care/PV2FP_FitGuide_.pdf/ Accessed: 25-Nov-2022.
12. Johnson & Johnson Vision Care. Acuvue Multifocal Fitting Guide. Available at: https://www.jnjvisionpro.com/sites/us/files/public/Products/ ACUVUE%20OASYS%20MULTIFOCAL%20PUPIL%20OPTIMIZED%20DESIGN/ acuvue_multifocal_4_page_fitting_guide.pdf Accessed: 25-Nov-2022.
13. CooperVision. Biofinity Multifocal Lens Fitting Guidelines. Available at: https://coopervision.com/sites/default/files/BFMF-Fitting-Guide.pdf Accessed: 25-Nov-2022.
14. Alcon. Professional Fitting and Information Guide – Dailies Total1 and Dailies Total1 Multifocal (Delefilcon A) Soft Contact Lenses for Single-Use, Daily Disposable Wear. Available at: http://embed.widencdn.net/pdf/plus/alcon/pzd8cvgagr/W900087400_PFIG_DELFCON_A_US.pdf?u=4rqn9d Accessed: 25-Nov-2022.
15. Coopervision. Optiexpert™ Contact Lens Calculator. Available at: https://coopervision.com/practitioner/tools-and-calculators/optiexpert Accessed: 19-Jul-2022.
16. Johnson & Johnson Vision. Acuvue® Multifocal Fitting Calculator. Available at: https://www.jnjvisionpro.ca/calculators-tools/fitting-calculator Accessed: 25-Nov-2022.
17. Pointer JS. Sighting Versus Sensory Ocular Dominance. *J Optom* 2012;5:52-5.
18. Gispets J, Arjona M, Pujol J, *et al.* Task Oriented Visual Satisfaction and Wearing Success with Two Different Simultaneous Vision Multifocal Soft Contact Lenses. *J Optom* 2011;4:76-84.
19. Wang B, Ciuffreda KJ. Depth-of-Focus of the Human Eye: Theory and Clinical Implications. *Surv Ophthalmol* 2006;51:75-85.
20. Pérez-Prados R, Piñero DP, Pérez-Cambrodí RJ, Madrid-Costa D. Soft Multifocal Simultaneous Image Contact Lenses: A Review. *Clin Exp Optom* 2017;100:107-27.
21. Retallic N, Sugimoto K. Development in Multifocal Contact Lens Design. Optician; Available at: https://www.opticianonline.net/features/development-in-multifocal-contact-lens-design Accessed: 02-Dec-2022.
22. Luensmann D, Schulze M-M, Woods J, *et al.* Fitting Success with Stenfilcon A Daily Disposable Multifocal Lenses. *Cont Lens Anterior Eye* 2022;45:101648.
23. McParland M, Walsh K, Comoroda D, Sulley A. Wearer Experience and Eye Care Professional Acceptance with a 1 Day Multifocal Contact Lens. *Clin Optom* 2022; Volume 14:223-35.
24. Bauman E. Material Effect on Multifocal Contact Lens Fitting of Lenses of the Same Optical Design with the Same Fitting Guide. *Cont Lens Anterior Eye* 2018;41:S60.
25. Woods J, Varikooty J, Lumb E. Validation of a Multifocal Contact Lens Online Fitting App. *Cont Lens Anterior Eye* 2019;42:e38.