

Scleral Lenses: A Comprehensive Guide to Their Benefits and Uses

Priya Sharma*

Department of Ophthalmology, Amity University, India

Introduction

Scleral lenses are a type of rigid gas permeable (RGP) contact lens designed to provide superior comfort and vision correction for individuals with complex eye conditions. Unlike traditional contact lenses that sit directly on the cornea, scleral lenses are larger in diameter and rest on the white part of the eye (the sclera), creating a tear reservoir between the lens and the cornea. This design allows for enhanced vision and comfort, especially for those with irregular corneas or dry eye syndrome. The unique design of scleral lenses makes them an ideal solution for individuals with conditions such as keratoconus, corneal ectasia, severe astigmatism, and dry eye syndrome. These lenses are particularly beneficial for people who cannot achieve satisfactory vision or comfort with standard contact lenses or glasses [1]. The tear reservoir under the lens helps keep the eye hydrated and reduces irritation, offering a significant improvement in comfort for individuals with dry or sensitive eyes. Scleral lenses are custom-fit to each individual's eye, making them highly adaptable and capable of addressing a wide range of visual needs. They are particularly effective at providing clear, stable vision by creating a smooth surface over an irregular cornea. The lenses are also useful for protecting the cornea from exposure to environmental irritants, such as dust, allergens, and pollutants. Although scleral lenses require a more detailed fitting process and regular maintenance, they offer significant benefits, including enhanced comfort, clearer vision, and protection for individuals with specific ocular conditions. As a result, scleral lenses have become an essential option for those seeking advanced vision correction solutions [2].

Benefits of scleral lenses

Scleral lenses offer several advantages over traditional contact lenses and glasses, especially for those with complex eye conditions. Some of the key benefits include:

Improved vision: Scleral lenses provide excellent visual clarity for individuals with irregular corneas. By creating a smooth tear reservoir, they compensate for corneal irregularities and improve visual acuity, even in cases of severe keratoconus, corneal scarring, or post-surgical complications [3].

Comfort: Unlike traditional RGP lenses that can be uncomfortable due to their direct contact with the cornea, scleral lenses provide enhanced comfort by creating a layer of moisture between the lens and the eye. This moisture helps reduce dryness and irritation, making scleral lenses an ideal solution for people with dry eye syndrome or those who suffer from eye discomfort with traditional lenses [4].

Better stability: Scleral lenses provide greater stability compared to soft lenses, as they rest on the sclera rather than the cornea. This makes them less likely to move around during blinking or eye movement, ensuring more consistent vision and comfort [5].

Protection of the cornea: Scleral lenses help protect the cornea from exposure to environmental irritants, such as dust, allergens, and pollutants. They also help prevent further damage to the cornea in individuals with conditions like corneal ectasia or following corneal

surgery [6].

Uses of scleral lenses

Scleral lenses are often recommended for individuals who do not achieve satisfactory vision or comfort with traditional soft contact lenses or glasses. Some of the primary conditions and scenarios where scleral lenses are used include:

Keratoconus: This condition causes the cornea to thin and bulge into a cone-like shape, leading to visual distortions and blurry vision. Scleral lenses can smooth the irregular surface of the cornea, providing clearer, more stable vision [7].

Corneal ectasia: Following refractive surgeries like LASIK, some individuals may develop corneal ectasia, where the cornea becomes weakened and bulges outward. Scleral lenses can offer significant vision correction and help stabilize the cornea.

Dry eye syndrome: People with chronic dry eye syndrome may find relief with scleral lenses. The tear reservoir under the lens helps maintain moisture and lubrication on the eye's surface, reducing dryness and discomfort.

Post-corneal transplant: After corneal transplant surgery, some patients experience irregularities in their cornea that affect vision. Scleral lenses can provide better visual acuity and protection to the newly transplanted cornea [8].

Severe Astigmatism: Scleral lenses can be used to treat individuals with high astigmatism that cannot be adequately corrected with glasses or traditional contact lenses.

Considerations and challenges

While scleral lenses offer numerous benefits, there are some considerations and challenges associated with their use:

Fitting Process: Scleral lenses require a more complex and detailed fitting process compared to standard contact lenses. The lenses must be custom-designed to ensure the best fit and comfort, which can take time and require multiple fittings.

Care and maintenance: Proper cleaning and care of scleral lenses are essential to maintain eye health and prevent infection. The lenses

*Corresponding author: Priya Sharma, Department of Ophthalmology, Amity University, India, Email: sharma_p@gmail.com

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need to be cleaned thoroughly and stored in a special solution when not in use. Some individuals may find the care routine more time-consuming than that of traditional lenses [9].

Cost: Scleral lenses are more expensive than regular contact lenses due to their custom design and fitting process. Additionally, they may require more frequent follow-up visits with an eye care professional to ensure the lenses are providing optimal vision and comfort.

Learning curve: Some individuals may find it challenging to adapt to wearing scleral lenses, especially in the initial stages. The larger size and insertion/removal process may require some practice and patience [10].

Conclusion

Scleral lenses are an innovative solution for individuals with complex eye conditions that affect vision or comfort. These large-diameter lenses offer significant benefits, including enhanced visual clarity, improved comfort for dry eyes, and a customizable fit for those with irregular corneas. While the fitting process can be more involved, the long-term advantages of scleral lenses—especially for conditions like keratoconus, dry eye syndrome, and post-surgical complications—can significantly improve quality of life and provide clearer, more stable vision. With proper care and maintenance, scleral lenses can offer a life-changing solution for those who need them, allowing individuals to see more clearly and comfortably than ever before.

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