SCLERAL PROFILE ASSESSMENT USING SLIT LAMP AND DIAGNOSTIC SCLERAL LENSES

Daddi Fadel, DOptom, DOptom, FSLS

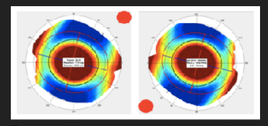
Purpose

To provide guidelines on assessment of scleral profile using a slit lamp and diagnostic scleral lenses (SLs).

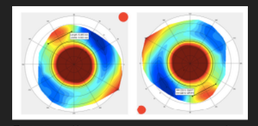
Classification of ocular surface profiles

Scleral shape may be rotationally symmetric or asymmetric [1]. Rotationally symmetric surface is defined as a shape which still look the same after a rotation. The number of times it matches the same shape is called order [2].

Rotationally symmetric shape of order 2. The red blob is to show the object rotating.



Rotationally symmetric topography of a toric sclera of order 2. Courtesy of G. DeNaeyer.



Rotationally asymmetric topography of an irregular sclera. The shape looks alike after rotation. Courtesy of G. DeNaeyer.

Along with this, spherical and toric surfaces may be considered rotationally symmetric. Conversely, a rotationally asymmetric sclera may be defined as exhibiting different height in the different quadrants. It may be considered regular when it has a constant change in its shape and irregular when it presents a relevant change in its shape within the same quadrant such as pinguecula, pterigium, blebs, ecc. The evaluation of the scleral shape is indispensable during scleral lens fitting since each profile needs a different SL design. Practitioners who do not have access to new technological devices may assess the ocular surface shape using the slit lamp and diagnostic SLs.

SCLERAL SHAPE		LANDING ZONE DESIGN
ROTATIONALLY SYMMETRIC	SPHERICAL	SPHERICAL
	ASPHERIC	ASPHERIC
	TORIC	TORIC
ROTATIONNALLY ASYMMETRIC	REGULAR QUADRANTS	QUADRANT SPECIFIC DESIGN
	IRREGULAR	IMPRESSION TECHNIQUE

Classification of scleral profile. Each scleral shape requires a different SL design, specifically different landing zone design.

Methods and discussion

The evaluation of scleral shape is achieved observing the behavior of diagnostic SLs applied on the eye and the clinical signs.

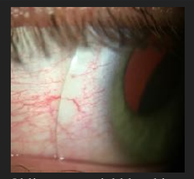
Clinical signs with the SL applied in the eye

1- Presence of sectorial conjunctival blanching

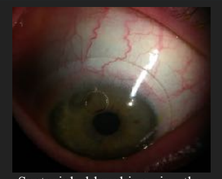
Fitting a spherical SL on a significantly toric or asymmetric sclera the SL will touch the flattest meridian and lift-off in the steepest one. Its occurrence in the horizontal meridian, which is the flatter meridian, means that the sclera exhibits a with-the-rule toricity. When it shows in one quadrant, the sclera presents an asymmetric shape.

Observation: Using diffuse illumination with white light. Evaluation of the eye in five different gaze directions, straight, superiorly, inferiorly, nasally and temporally.

Graphic representation of a surface presenting a with-the rule toricity.



Oblique sectorial blanching showing a oblique toric sclera.

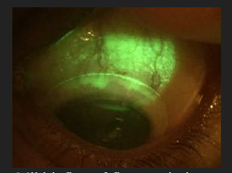


Sectorial blanching in the vertical meridian showing an against-the-rule toric sclera.

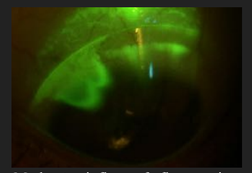
2- Fluorescein influx

The pathway of the fluorescein into the liquid reservoir indicates that the lens is lifted off in that specific area. The influx in the vertical meridian shows a with-the-rule toric sclera. If the influx is excessive, the haptic zones should be steepened in the area where the lens is lifting-off.

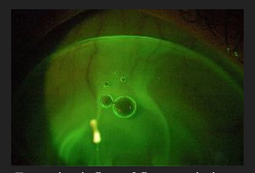
Observation: Using diffuse illumination with cobalt blue light and instilling fluorescein with SL applied in the eye.



Mild influx of fluorescein into the liquid reservoir.



Moderate influx of fluorescein into the liquid reservoir.

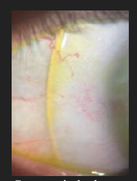


Excessive influx of fluorescein into the liquid reservoir.

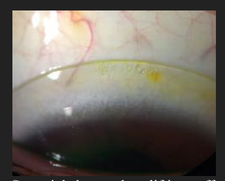
3- Lens edge lift-off

Lens edge may lift-off in a specific area showing a scleral toricity or asymmetry.

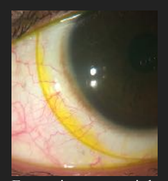
Observation: Using parallelepiped or direct focal illumination with white light. Instilling fluorescein in the eye, a lens edge lift-off in a specific area may show as a mild stained pooling underneath the lifted edge. Evaluating the eye in five different gaze directions.



Sectorial lens edge lifting off.



Sectorial lens edge lifting off with air bubbles formation.



Excessive sectorial lens edge lifting off.

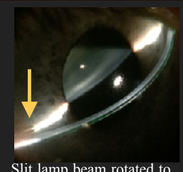
4- Using a toric scleral lens

Applying a toric SL may confirm the presence of a scleral toricity.

Observation: Using diffuse illumination with white light with the eye looking straight and superiorly. SLs are marked with a laser sign or black dot. To identify the scleral toricity, it is necessary to rotate the SL with a finger. If the SL recovers the initial position, the sclera is toric. To determine the axis of the meridian, rotate the beam of the slit lamp to the laser marks.

Toric SL marked with laser signs.

Toric SL marked with black dots. This figure shows also a sectorial SL periphery lifting off.



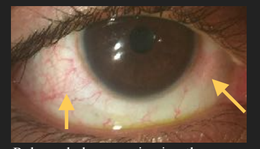
Slit lamp beam rotated to the laser mark.

Clinical signs after lens removal

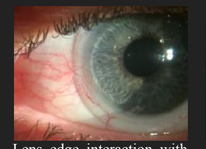
1- Conjunctival hyperemia

The appearance of a rebound hyperemia may indicate a significant compression of the landing zone on conjunctival blood vessels in the area where blanching was detected. Also, the touch of the lens edge with conjunctival irregularity such as pinguecula, symblepharon, etc. may cause conjunctival redness.

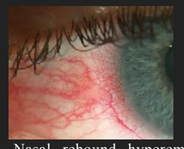
Observation: Using diffuse illumination with white light. Evaluating the eye in five different gaze directions.



Rebound hyperemia in the area where blanching was detected.



Lens edge interaction with pinguecula.

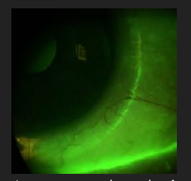


Nasal rebound hyperemia caused by the touch of the SL edge with the pinguecula of the same eye.

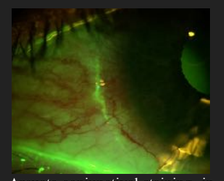
2- Presence of an arcuate conjunctival staining

An arcuate conjunctival staining may occur in presence of SL impingement. if it shows in the horizontal meridian, the sclera presents a with-the-rule toricity. When it appears in one quadrant, the sclera is asymmetric.

Observation: Using diffuse illumination with cobalt blue light and instilling fluorescein in the eye. Detection in five different gaze directions.



Arcuate conjunctival staining caused by SL impingement.



Arcuate conjunctival staining in the same eye above, where the lens edge was touching the pinguecula.

References

1. Fadel D. Landing zone: is a neglicted parameter ? Presentation at the International Congress of Scleral Contacts. Miami, 2017 July, 28.

2. Jalie M. Ophthalmic lenses and dispensing. Page 16. Butterworth Heinemann, Oxford 1999.

Author correspondance: dfadel@tin.it