This course seeks to provide the audience with improved skills in scleral lens fitting. Scleral lens fitting is a newer facet of therapeutic contact lens use and fitting philosophies remain highly varied among specialty lens fitters. The instructor uses a grand rounds format to illustrate variations in fitting strategies in the context of various, challenging clinical presentations.

**Case 1: Pandysautonomia**

First described in 1969, features reminiscent of the auto-immune failure of severe Guillain-Barre syndrome

Presenting sx's may include severe orthostasis, impairment of GI motility & bladder function, impotence, impairment of pupillary reaction and accommodation, dryness of the eyes/nasopharynx/skin

Sometimes completely resolves but patients are usually left with persisting disabling symptoms.

**24 yo Asian female referred by the Duke cornea service.**

Systemic Dx : Acute Pandysautonomia

Severe Sicca Syndrome, corneal scarring OU with OS chronic exposure ulcer

Along with chronic dry eye sx’s pt's chief complaint is chronic hazy vision left eye.

Using AT's OS multiple times a day.

Current Systemic Medications: Omnaris Nasal spray, Ventolin inhaler, Yaz B.C. Pill

**BCVA**

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<th></th>
<th>OD</th>
<th>20/20- K 42.75/44.75</th>
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<td>OS</td>
<td>20/70- PH 20/50- K COULD NOT MEASURE</td>
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Slit lamp findings: OD Puncta open / 1+ conj circumlimbal injection/ 1-2+ band PE staining / AC D&Q / Lens clear
OS Puncta scarred closed / 1++ conj diffuse injection / 2+ band epi loss with vascularized scarring / AC D&Q / Lens clear

Plan: OD fit with soft toric silicon hydrogel lens, OS fit with scleral lens

Final VA: OD 20/20- OS 20/25+

Marked reduction in symptoms

CURRENT ESTABLISHED SCLERAL LENS FITTING PRINCIPALS:

1/ Sag depth should allow clearing the entire cornea- suggested clearance 50 to 400 microns

2/ Conjunctival / scleral landing should be beyond the limbus, with no signs of edge impingement

3/Tear exchange under the lens should be confirmed with fluorescein dye instillation

Clinical Pearl: The instructor has found that in using scleral lenses for managing irregular corneas, a larger clearance, greater than 300 microns, gives superior comfort and lens tolerance. It is also acceptable if the lens is lightly resting on the top of the cornea; this confirms that it is not impinging on the limbus and usually does not bother the patient.

Case 2: A series of 8 patients with severe ocular sicca syndrome due to graft vs. host disease (GVHD).

A series of 8 patients were fit with scleral lenses by the instructor for the management of GVHD ophthalmic complications. The primary goal of fitting was to reduce the discomfort and irritation of chronic dry eye, but improvement of vision was also an expected benefit of the treatment.

The age range of patients at presentation was 23 to 59 year of age, Mean age was 45.1 years. Only 1 of them were female.

Of the 8 patients fit, 1 did not return for dispensing, the reason was not determined.

Of the 7 patients that completed dispensing, all stated that the lenses provided great relief and improved subjective vision. BUT: They all complained that the lenses filmed up quickly and needed to be removed and cleaned, often several times a day. For some this was very debilitating.

6 of the 7 patients were lost to follow up after a year and did not call for new replacement lenses suggesting that they had discontinued wear. The last patient that I fit is still currently wearing them.
Clinical Pearl: Case 1 and the series of patients in Case 2 provide great insight into the use of scleral lenses for the management of ocular surface disorders. The instructor has found that in this clinical presentation the following lens design considerations should be used:

- Sagittal depth of the scleral lens should be minimized to the point that there is less than 100 microns clearance over the cornea. This reduces the amount of volume for the collection of debris under the lens.

- Lens landing curves should be widened to cover more conjunctiva. Most lenses will be greater than 16.6 mm for this use.

The instructor has also found that dry eye/ocular surface patients should not be fit with a scleral lens unless they have exhausted all other forms of ocular surface supportive therapy. He refers to this as “The ocular surface full court press”

Regular use of AT’s, preferably PFAT”s
Topical cyclosporine gtt. B.I.D.
Punctal occlusion x 4
Lid management
  Routine warm compress
  Consider Lipiflow
  In-office MG expression
Omega 3 supplements
Trial oral macrolide, minimum 30 days
Pulse topical corticosteroid treatment
?Trial Sil Hy BCL

Case 3: Severe corneal ectasia

54 yo AAM referred by the Cornea Service

Ophthal Hx: Long hx of roughly symmetric Keratoconus Dx
  - OU dramatic circumferential corneal peripheral degenerative process
    (Terrien’s Vs Mooren’s Vs Other??)
  - OD S/P complicated pterygium excision with corneal scarring

C/O Poor VA OU with glasses, could not tolerate RGP lenses, Hybrid lenses “stuck to eyes”

Med Hx: HTN, Chronic pain, Hypercholesterolemia

Meds: citalopram, fentanyl transdermal, flunisolide nasal spray, lisinopril, methocarbamol niacin, nifedipine, oxycodone, pravastatin, zolpidem, ranitidine, minocycline,
Omega 3 supplements
Topical Eye Meds: Cyclosporine OU B.I.D.
  Prednisolone acetate OU B.I.D.
  PFATS OU often
BCVA

OD  -3.00 -5.75 X 070  20/40-  PH  20/25+  K 47/52  irreg
OS  -6.50 -6.00 X 062   20/30- PH  NI                K  50/57  irreg

SLIT LAMP FINDINGS:

OU + MUNSON’S SIGN

Lids  2++ MGD with marginal telangiectasis

Conj/Sclerae:  2+ diffuse injection with superficial cicatricial changes.

Corneas: 4+ Peripheral vascularization, haze, thinning 360 degrees

A/C :  D/Q OU

LENSES:  clear

R  20/25- “Crisp”       L  20/25  “Crisp”

Clinical Pear:  Highly irregular corneas are the most common indication for fitting scleral lenses. If the ocular surface is not inflamed or excessively dry, the instructor has found larger corneal clearance gaps 300 – 500 micron range tend to be more comfortable for the patient. Keeping the landing zone width to a minimum also helps with tear exchange, and makes lens insertion easier. Most of the instructor’s fits on this type of lens have diameters in the 15.6 – 16.6 mm range.

Case 4:  Bilateral Kpro prosthetic corneas.

77 yo M referred by the Cornea service

Chief complaint:  Very poor vision OU when wearing his BCL’s over his Kpros.

-Sustained bilateral chemical burns from calcium carbonate in 1933 (pt. 22 years of age)
  - Low vision most of his life from corneal scarring and stem cell loss.
  -OS  sustained ruptured globe
  -Secondary glaucoma OU

-Ophthal Hx:  Multiple surgeries OU,  S/P PK OU
  -Bilateral Kpro prostheses
  -Bilateral pseudophakia
  -Diabetic retinopathy
- Medical Hx: HTN, IDDM
- Systemic Medications: L-Thyroxine, sertraline HCL, metopolol, metformin, insulin, Fe, folate, B12, ASA 81 MG, multivitamins
- Eye Medications: Vancomycin sol. OU B.I.D  moxifloxacin OU B.I.D. Combigan OU B.I.D.

Kpro OD

Topography of BCL OD

Topography BCL OS

Scleral lens over Kpro  Final VA with Scleral lenses: R 20/20- L 20/30-
Clinical Pearl: Scleral lens can be fit over the Kpro prosthesis. Follow the standard fitting guide. The patient needs to remove the lens at night.

**Case 5: KCN with corneal hemorrhage**

48 YO WM decades history of bilateral KCN

- S/P bilateral AK’s 10 year ago to try to reduce astigmatism
- Was fit many year ago with hybrid lenses by my predecessor
- I had assumed care of the patient in the previous year and had monitored his corneas with minimal changes to lens parameters
- Presents with complaint of right eye irritation and lens intolerance.

OD  sc  20/200 ph 20/30-

OS  cc (CL) 20/25

Plan: Patient is a delivery truck driver and cannot tolerate driving monocular for long. The lens was fit at presentation with a scleral lens using current accepted fitting criteria. The lens was dispensed about a week later at which time the hemorrhage had shown significant resolution with contact lens cessation and FML 0.1% B.I.D. to reduce inflammation. Vision with scleral lens was 20/25 and the lens was well tolerated.

Clinical Pearl and case follow up: The instructor had encountered this case about a year into his scleral lens fitting experience, and was already very experienced with hybrid lens fitting. This was one of several cases that suggested to the instructor that scleral lenses would be far superior to hybrids in most specialty fitting situations. About a year later, this patient presented with stable vision in both eyes, was comfortable in his lenses (wearing the scleral in the right and hybrid in the left), but insisted he preferred feel and vision of the hybrid lenses, and begged us to refit his right eye with another hybrid. The instructor refit him with one of the newer higher Dk designs, and to this day is doing well with it and prefers it to the scleral.
Case 6: Challenge of the irregular cornea with elevated bleb adjacent to limbus

68 YO AAM referred by the Cornea Service

OU hx of PKP for sever KCN

OD graft irregular, BCVA with glasses 20/100
OS graft regular, BCVA with glasses 20/30+

OU hx of advance POAG R>L

OD s/p Trabeculectomy, also on IOP gtts
OS s/p SLT, on IOP gtts

PT has hx of RGP wear OD, but cannot tolerate. Was referred for new contact lens approach.

OD slit lamp sketch

Scleral or hybrid? Bleb is too elevated and encroaches on limbus

Plan: Corneoscleral lens.

Case 6 course:

OD is fit with Corneoscleral lens

Lens aligns with cornea

Lifts just slightly off at limbus

BCVA is 20/40

Pt immediately experiences diplopia, also requires prism management for decompensating esophoria.

Pt tolerates the lens well.
20 months of close follow up and 1 lens modification:

Graft fails, BCVA 20/200   Lens discontinued. Considering repeat PK.

Clinical Pearl: Under the 2013 nomenclature guidelines of the Scleral Lens Education Society, a “Corneoscleral” lens is an RGP lens that rests both on the cornea and the sclera.

Because the landing zone does not extend on to the sclera far enough to bear the entire lens, it must touch the cornea

The smaller diameter of these lenses makes them useful in these cases were obstacles at the limbus prevent the use of a true scleral lens, or when the patients palpebral aperture is just too small to allow insertion of a scleral lens.

Close alignment of the lens with the cornea creates complex situations that also exist with large-diameter corneal lenses, including lens seal-off, poor tear film exchange, and areas of bubble entrapment.

The instructor currently avoids the use of these lenses and has had much better success with hybrid lenses when there is a limbal elevation. In Case 6 the bleb was just too high. Results are usually better with a large diameter RGP lens design. The instructor is not currently aware of any “slam dunk” fitting criteria for the Corneoscleral lens design. For extremely petit eyes, these lenses may be fit with scleral lens fitting criteria.