Specialty Contact Lens Management for Keratoconic Pilots: A Case Series

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Background:

Pilots with keratoconus wear specialty contact lenses (CL) to meet the visual requirements for operating airplanes. Important considerations when fitting pilots for specialty CLs include age, license level, stage of keratoconus, surgical history, vision, color vision, lens comfort, and avoidance of visual fluctuations from mid-day fog and/or lens deposits. Three cases of civil pilots with keratoconus of different stages are discussed in this mini series.

Case 1: Young New Pilot

A 25-year-old new student pilot with no spectacle-wear was referred for a keratoconus evaluation and CL fit after having his first eye exam.

Distance VA sc : 20/30-2 OD, 20/70 OS, 20/30 OU
Pinhole VA: 20/20-3 OD, 20/60 OS
Randot stereo test: (-) local or gross stereopsis
HRR color test: 6/6 pass OD, OS
Corneal Tomography:
(+) small, central cone below the visual axis, OD
(+) small, more inferiorly displaced cone, OS

Scleral Lens (ScCL) Fitting & Management

OD: Oblate lens; BCVA distance 20/20
OS: Oblate lens; BCVA distance 20/40; OU: BCVA 20/20
(+) Seeing undefined shapes on Randot test with ScCLs at 1 month follow-up, and improved to 250 seconds of arc globally, and 63 seconds of arc locally after 2 months.
(+) Patient claimed to have received clearance for Class 3 pilot license.

FAA Regulation on BCVA:[2]

	1st class: Airline transport pilot	2nd class: Commercial Pilot	3rd class: Private pilot
Distance BCVA	**20/20 each**	**20/20 each**	**20/40 each**
Intermediate BCVA	**20/40 each at 32 inches at age 50 and over**		**No requirement**
Near BCVA	**20/40 each at 16 inches**		

Case 2: Emerging Presbyopic Pilot

A 44-year-old emerging presbyopia pilot, status-post cross-linking for 2 years and scleral lenses-wear, OU, started to experience near asthenopia, especially at the end of the day.

Case 2 Management & Plan:

1. Fit a Front Toric ScCL OU to achieve optimal distance VA.
2. Prescribed +1.00D OU spectacles over ScCLs for best Near VA.
3. Prescribed warm compresses pre- and post- lens wear and a medium viscosity preservative-free artificial tear to instill upon lens insertion to maintain the integrity of ocular surface without obscuring vision.

FAA Regulation on Presbyopia Correction:[2]

Monocular Vision CL	**Not allowed**
Bifocal/ Multifocal CL	**Acceptable; minimum 1 month adaptation**
Intraocular lenses	**Acceptable; minimum 3 months post-op**
Pilocarpine	**Not allowed**

Case 3: Presbyopic Pilot with Edematous Grafts

A 65-year-old commercial airline pilot was status-post corneal transplant for over 30 years, OU. He habitually wore ScCLs OU, with trifocal glasses over them. At a post fitting/dispensing follow-up visit, he was incidentally found to have moderate corneal edema, OU, with no subjective symptoms.

Pertinent findings:
Pachymetry (um): 702 OD, 683 OS
Endothelial cell count (mm^2): 1656 OD, 819 OS

Case 3 Management and Plan:

1. Immediate discontinuation of ScCL wear.
2. Prescribed sodium chloride 5% hypertonic ophthalmic drops qid, and prednisolone acetate 1% qid, OU.
3. Referred to his Ophthalmologist (OMD) next day;

Pt. was cleared by OMD to resume CL-wear 1 month later.

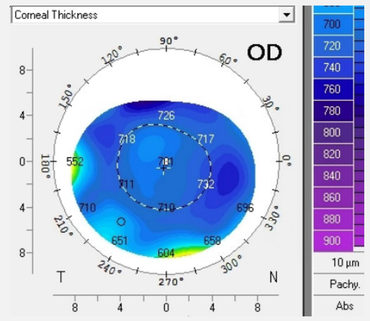

Figure 1: Corneal Thickness Map OD measuring central corneal thickness of 702 microns

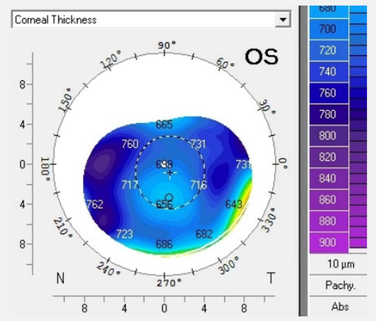

Figure 2: Corneal Thickness Map OS measuring central corneal thickness of 683 microns

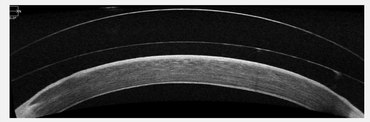

Figure 3: Anterior OCT OD with scleral lens measuring 298 Microns of central clearance

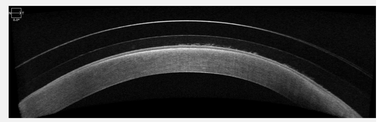

Figure 4: Anterior OCT OS with scleral lens measuring 240 Microns of central clearance

Case 3 Next Steps:

With his history of lens-flexure secondary to lid tension, ScCLs with channels/fenestrations were preferred. Close-monitoring of endothelial cell-count was also warranted.

While the patient recently stopped flying due to his age (limit for commercial airlines is 65 years old), he is hopeful about returning to flying once the age-limit is raised by the airlines.

Conclusion:

When managing specialty CL-wear for keratoconic pilots, contact lens practitioners must look beyond the basic quantitative visual requirements set by the FAA and strive to maximize qualitative vision and corneal health.

References:

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