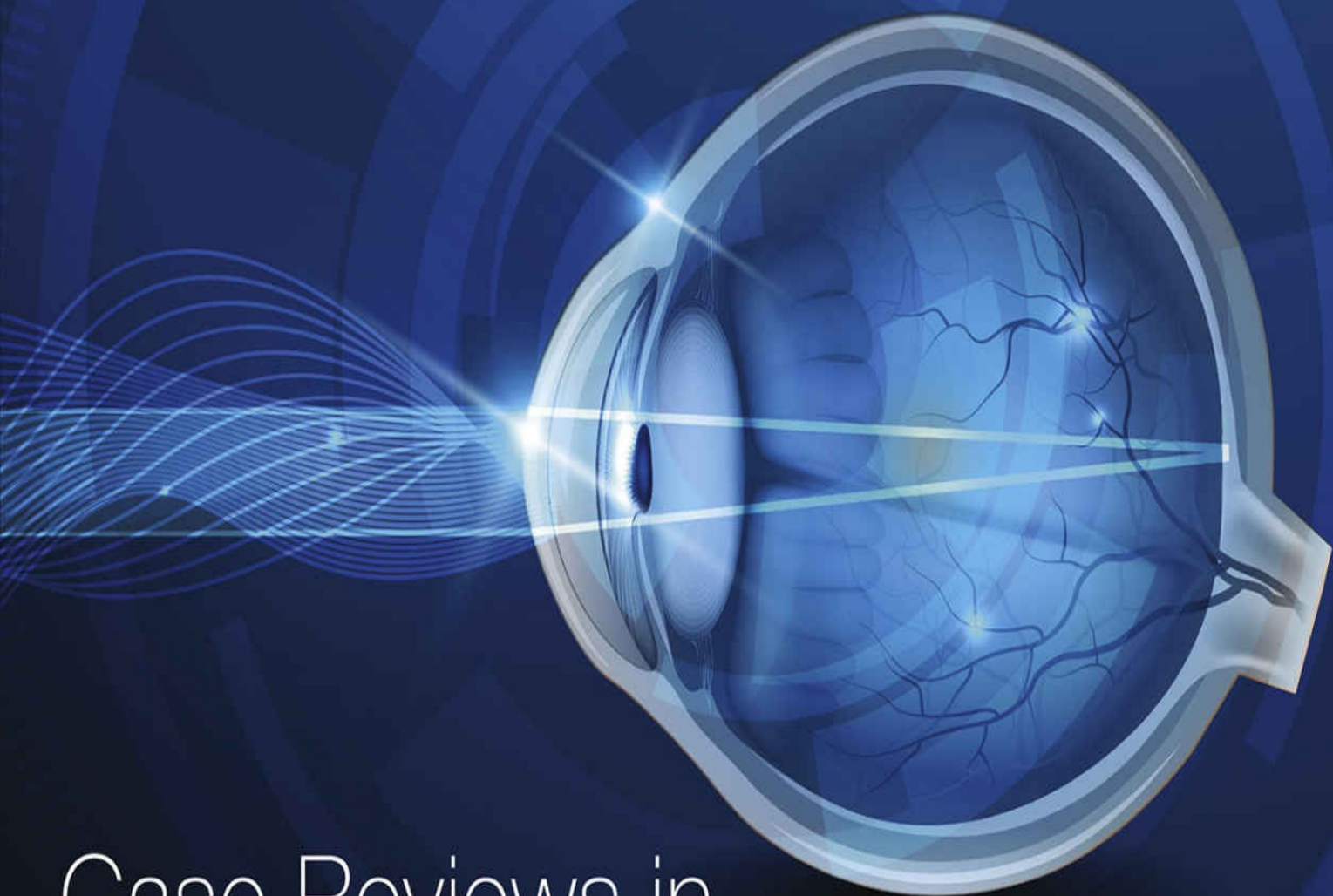


Neil J. Friedman
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Case Reviews in
Ophthalmology

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Second Edition

Case Reviews in Ophthalmology

SECOND EDITION

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Edinburgh London New York Oxford Philadelphia St Louis Sydney Toronto 2018

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ISBN: 978-0-323-39059-0

eISBN: 978-0-323-39061-3

Printed in China

Last digit is the print number: 9 8 7 6 5 4 3 2 1

Content Strategist: Russell Gabbedy

Content Development Specialist: Nani Clansey

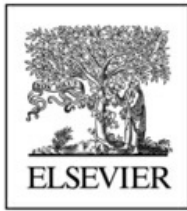
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Preface

Neil J. Friedman, MD

Peter K. Kaiser, MD

It has been gratifying to witness the success of *Case Reviews in Ophthalmology*, and we are delighted to present the second edition of this book. The new edition follows the same familiar case-based format with accompanying answers, but we have expanded the contents by adding 30 new cases. Our goal is to present additional topics that are important and relevant to clinicians. We carefully selected the new material to complement the existing cases and to further aid in learning and studying core information that we all must know.

We hope you continue to find this case method of learning helpful for understanding clinical problems as well as preparing for exams.

Acknowledgments

Neil J. Friedman, MD

Peter K. Kaiser, MD

The updated edition of this book has been a group effort, and we are grateful to all of our colleagues, friends and family who have helped us along the way.

We continue to be blessed to work with a superb team at Elsevier: thank you Russell Gabbedy, Nani Clansey, Srividhya Vidhyashankar, and your incredible staff.

Most importantly, we must thank our families: Mae, Jake, Dawn, Peter (PJ), and Stephanie, who continue to support our book writing habit.

Optics/Refraction

Case 1



A 48-year-old woman with myopia complains of progressive deterioration in distance and near vision in both eyes for the past 2 years. She can improve her vision by sliding her glasses down her nose. Her past medical history is significant for diabetes for 10 years, for which she takes glyburide. She reports blood sugar levels usually between 120 and 140 mg/dL and a recent hemoglobin A1c of 6.8%.

1. What is the differential diagnosis?
2. What other history would you like to know?

3. What would your exam entail?

Additional information: her current glasses are – 5.00 D with an add of + 1.25 D OU, her manifest refraction is – 4.25 D OD and – 4.50 D OS with + 1.50 D add OU. The crystalline lenses are clear OU and there is no diabetic retinopathy. Cycloplegic refraction reveals – 4.25 D OU.

4. What is your diagnosis and treatment plan?

ANSWERS Case 1

1. Decreased myopia and increased presbyopia. The change in refractive error may be due to overcorrection in her current distance spectacle prescription, cataracts, diabetic macular edema, or medications (ie, chloroquine, phenothiazines, antihistamines, benzodiazepines).
2. How old is her current prescription and what type of glasses are they? Does she have glare / halo / starburst from lights? Has the diabetes ever affected her retina and if so did she ever have any retinal treatment? Is she taking any other medications?
3. Measure her current glass prescription, perform a manifest refraction, and then a complete eye exam with attention to the crystalline lens for cataract and retina for diabetic macular edema.
4. Myopia / presbyopia with overminused glasses. A new glasses prescription should be given using the power from her manifest refraction. She should continue good blood sugar control and return for annual eye exams.

Case 2

A 50-year-old man with low myopia is noticing more difficulty reading with his distance glasses. He usually takes his glasses off to read but says this is becoming a hassle, and therefore he wants a new pair of glasses.

1. What is the problem?
2. What are his options?
3. What are the two prismatic effects that occur with bifocals?
4. Discuss the pros and cons of different bifocal designs.

ANSWERS Case 2

1. Presbyopia.
2. The glasses options are progressive, bifocal, or single vision lenses. Glasses for the computer can be single vision, trifocal, or computer bifocals.
3. Image jump and image displacement.
Image jump is related to the position of the optical center of the add segment. It is produced by the sudden prismatic power at the top of the bifocal segment (it is not influenced by the type of underlying lens). As the patient's line of sight crosses from the optical center of the distance lens to the bifocal segment, the image position suddenly shifts up owing to the base-down (BD) prismatic effect of the bifocal segment.
Image displacement is due to the total prismatic power of the lens and bifocal segment. It is minimized when the prismatic effect of the bifocal segment and distance lens are in opposite directions.
Image jump is more bothersome than image displacement, so the segment type should be chosen to minimize image jump.
4. The advantage of progressive lenses is the blended segment without a visible line and there is no image jump; however, there is usually an adaptation period, especially for patients who have previously worn lined bifocals.
Bifocal lenses have a visible line and there are different types of segment styles – round-top, flat-top, and executive. Round-top segments produce the most image jump, and they cause more image displacement in myopes than in hyperopes. Flat-top segments minimize image jump, and image displacement is less in a myope than a hyperope. Executive bifocals have a larger area

dedicated to near vision, and there is no image jump because the optical centers are at the top of the segment.

Case 3



A 46-year-old woman complains of trouble with near vision. Her current glasses are 4 years old and she says her eyes feel strained when she reads. She wants to get a new prescription for glasses.

1. What is the technique for subjective manifest refraction?
2. How would you determine her add power?

ANSWERS Case 3

1. Starting with her current prescription in either a trial lens or phoropter, the distance vision is checked monocularly and the sphere is adjusted first as she is asked to read progressively smaller lines on the acuity chart. The axis of any cylinder is then refined with a Jackson cross cylinder. The vision must be at least 20/40 to use the 0.25 cross cylinder. Once the correct axis is determined, the amount of cylinder is then determined in a similar fashion with the cross cylinder. The sphere is then rechecked until the best acuity is achieved. Finally, three methods

can be used to perform binocular balance to equally control accommodation in both eyes during distance refraction: prism dissociation (3 prism diopters [PD] BU over one eye and 3 PD BD over the other with a Risley prism), balanced fogging (fog both eyes and alternate cover until equally fogged), or duochrome test (red–green balance both eyes).

2. To determine the bifocal add, measure accommodation monocularly then binocularly. A Prince rule (reading card with a ruler calibrated in centimeters and diopters to measure amplitude of accommodation) can be used with the phoropter to determine the necessary accommodative requirement for various near vision tasks. Half of the patient's measured accommodative amplitude should be held in reserve to prevent asthenopia. For example, if the patient desires to read at 40 cm (2.5 D), the Prince rule measures 2.0 D of amplitude (1.0 D is available to patient to prevent asthenopic symptoms), then the add power is 1.5 D (the difference between accommodation [1.0 D] and the total amount of accommodation required to read [2.5 D]). With the calculated add in front of the distance correction, measure the accommodative range (near point to far point of accommodation). If the range is too close, then reduce the add in steps of 0.25 D until the correct range is found.

Case 4



A 31-year-old woman with a refractive error of -2.50 D in both eyes is interested in refractive surgery. She has become contact lens intolerant and glasses interfere with her sports activities and lifestyle.

1. What would you tell her about surgical correction of her myopia?
2. What are the complications of LASIK (laser-assisted in situ keratomileusis)?

Additional information: this patient undergoes LASIK. The day after surgery she is very happy with her 20/20 vision. On exam her left eye has the finding seen in the photo.



3. What is the diagnosis and what would you do?

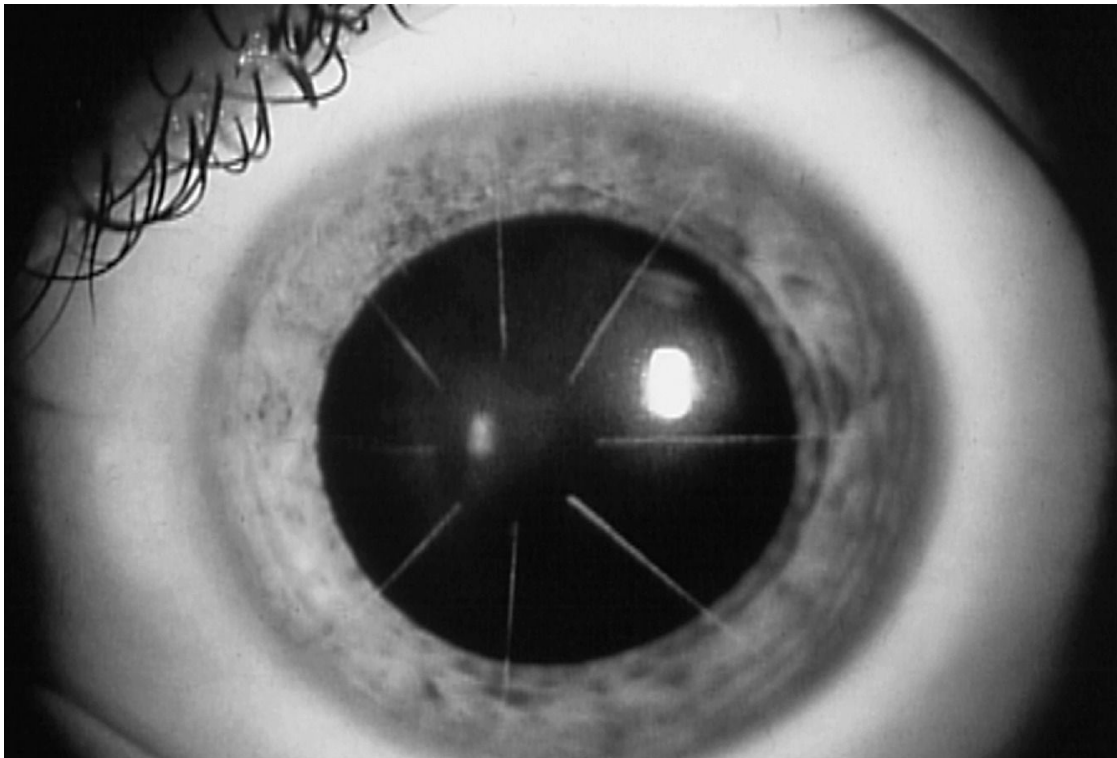
ANSWERS Case 4

1. There are a number of surgical options for correcting low myopia. The most common is excisional (laser vision correction [surface ablation, LASIK]). Other techniques include incisional (radial keratotomy) and additive (implants [Intacs]). The indications, risks, benefits, alternatives, and complications of surgery should be discussed as well as the advantages and disadvantages of each of the procedures. She should also be told about what to expect during the preoperative and postoperative periods.
2. LASIK complications include: over- or undercorrection, glare / halos at night, dry eye, irregular / poor flap (too thick or thin, button-hole, incomplete, free cap), epithelial defect,

decentered ablation, irregular astigmatism, flap dislocation, striae, epithelial ingrowth, interface inflammation (diffuse lamellar keratitis [DLK]), central toxic keratopathy, infection, scarring, and keratectasia. Late DLK may occur (any time in the future) after a corneal abrasion.

3. Stage 2 DLK, which requires frequent topical steroids. Steroid eye drops should be prescribed initially every hour while awake and steroid ointment at bedtime. The eye should be checked daily for improvement, and the steroids are tapered as the DLK resolves. If the interface inflammation progresses to stage 3 or 4, then the flap should be lifted and the stromal bed irrigated. A short course of oral steroids may also be given.

Case 5



A 50-year-old man reports a history of radial keratotomy (RK) surgery 20 years ago. He has noted glare and starbursts at night since the surgery. He used to experience fluctuating vision but says this has improved. He also notes that his vision has gradually

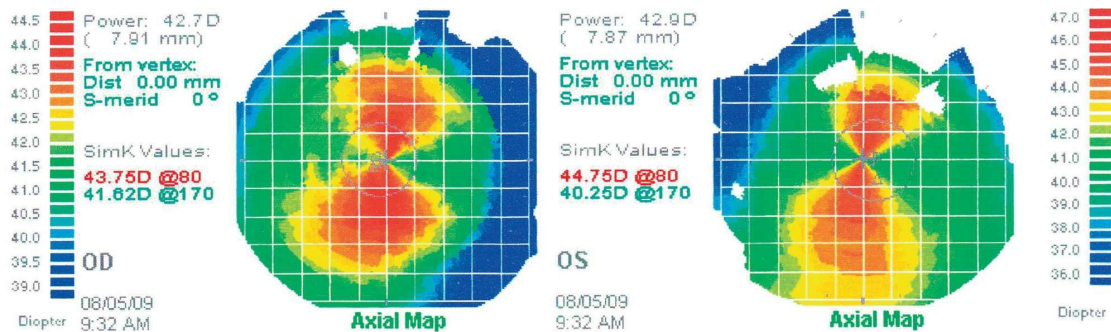
deteriorated, especially over the last 10 years, and he needs stronger glasses for better reading as well as distance vision.

1. What would you specifically look for on examination?
2. What would you tell him about his symptoms and what are the treatment options?

ANSWERS Case 5

1. Manifest refraction, pupil size in dim and bright light, the corneal status (number of RK incisions and optical zone size, central irregularity, scarring, dryness), presence of cataract and macular pathology. If there is visual fluctuation throughout the day, then morning and afternoon refractions should be performed.
2. Glare / starbursts are common after RK, particularly with smaller optical zones. The deep radial corneal incisions change the shape of the cornea but also weaken the cornea and can produce fluctuations in vision throughout the day and from day to day as refractive shifts occur. Altitude and humidity changes can exacerbate the fluctuations. Over time, many RK patients develop a progressive hyperopic shift (PERK study 10-year results found 43% of patients had at least a 1 D shift). In addition, this patient is presbyopic and is noting the combined effect of progressive hyperopia from the RK plus increasing presbyopia. Treatment options include: correction of any refractive error, and pharmacologic (alphagan or pilocarpine) to reduce pupil size and decrease nighttime glare / starburst. He may need different glasses for different times of the day depending on the amount of fluctuation. If the refractive error is stable, then surface ablation can be performed with topical mitomycin C (to prevent scarring). If his symptoms are due to a cataract, then cataract surgery should be discussed and the patient informed that the refractive outcome is less predictable because of his previous RK surgery (eg, accurately measuring central corneal power), and therefore he may require a second procedure (laser vision correction, piggyback IOL, or IOL exchange) to correct a significant residual refractive error.

Case 6



A patient with astigmatism complains of problems adapting to her new glasses and says she can see better with her old glasses. Her old prescription is $-5.00 + 2.00 \times 85$ OD and $-6.50 + 3.50 \times 85$ OS; her new prescription is $-5.25 + 2.25 \times 95$ OD and $-7.50 + 4.25 \times 80$ OS.

1. How would you address her complaint?
2. What does the corneal topography show?
3. What is the typical natural history of corneal astigmatism?

ANSWERS Case 6

1. The new glasses should be measured with a lensometer to confirm that the prescription is correct, the ocular alignment of the lenses checked, and the visual acuity recorded. The manifest refraction should then be rechecked carefully, and consider performing a cycloplegic refraction. If there is an error in the glasses or lens alignment, then simply remaking the lenses may resolve the problem. If the repeat manifest or cycloplegic refraction is different from the glasses prescription, then a new prescription should be given to the patient. Finally, patients with large levels of correction are particularly sensitive to small changes in their glasses prescription (ie, > 0.50 D and / or $> 5^\circ$ axis rotation), and the vertex distance and base curve of the lenses must also be taken into account. Therefore it may be necessary to make only a small change in the prescription at a time until the

full change can be tolerated. When there is a significant change in the prescription the patient should be told of this and warned that it may take some time to adapt to the new glasses.

2. The corneal topography demonstrates regular with-the-rule astigmatism, which appears as a vertically oriented symmetric bowtie. According to the SimK values, there is 2.13 D of astigmatism in the 80 degree meridian OD and 4.50 D of astigmatism in the 80 degree meridian OS.
3. Corneal astigmatism tends to be with-the-rule in children and typically decreases with age. Adults tend to have against-the-rule astigmatism that increases with age. Approximately 50% of the population has 0.75 D or more of astigmatism.

Case 7



A 38-year-old myopic woman complains that her bulky, heavy glasses are a nuisance and she would like to investigate other options.

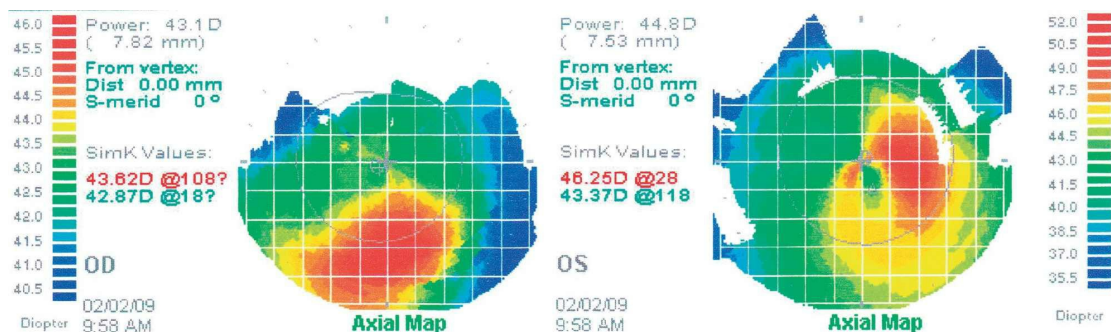
1. What are the alternatives and what other information would you like to know?

Additional information: she has worn glasses for 30 years, the

last change was 7 years ago, she is not interested in contact lenses, has no other eye problems, and has not noticed a recent change in vision. Her current glasses are $-7.25 + 1.00 \times 100$ OD and $-8.00 + 2.50 \times 20$ OS, her vision with these glasses is 20/20 OU, her refraction yields the same prescription and vision. There is no evident anterior or posterior segment abnormality on slit-lamp exam and ophthalmoscopy. She is interested in refractive surgery.

2. What surgical options are available and what tests would you perform?

Additional information: corneal pachymetry is thinnest centrally and measures $505 \mu\text{m}$ OD and $510 \mu\text{m}$ OS, angles are open / grade 4 OU, anterior chamber depth is 3.5 mm OD and 3.6 mm OS, and endothelial cell count is normal OU. Her corneal topography shows:



3. How do you interpret the topography maps, and how do the new data affect her surgical options?

4. What are the complications of phakic IOL implantation?

ANSWERS Case 7

1. Depending on her refractive error her options include: new glasses with high index lenses, contact lenses, and refractive surgery. It would be important to know more about her ocular

history and exam. Specifically, when did she start wearing glasses, when was her last prescription change, has she tried contact lenses, and if so what type, for how long, and what did she think about them? Does she have any other past ocular history? Has her vision changed recently? How do the glasses interfere with her lifestyle, daily activities, and hobbies? Has she thought about refractive surgery and, if so, what does she hope to accomplish? With regard to the eye exam, what is her current prescription, visual acuity with correction, and manifest refraction? Are there any abnormalities on exam?

2. Possible surgical options are laser vision correction, phakic IOL, and refractive lens exchange (RLE). However, the disadvantages of RLE are the loss of accommodation and greater risk of vision-threatening complications due to more invasive surgery. To assist in deciding which option is most appropriate, it is necessary to obtain corneal topography, pachymetry, gonioscopy, anterior chamber depth, and endothelial cell evaluation.
3. The CVK reveals form fruste keratoconus OD and mild pellucid marginal degeneration OS, and her corneas are thin, so she is not a candidate for laser vision correction. Her surgical options are lens procedures: phakic IOL or RLE. Since she has a stable refraction and excellent vision with glasses at age 38 years old, it is unlikely that her corneas will change significantly. If she desires phakic IOL surgery, a toric design should be considered to correct her astigmatism OS since corneal astigmatic procedures (corneal-relaxing incisions and laser vision correction) should not be performed. However, a small amount of residual ametropia could possibly be corrected with photorefractive keratectomy (PRK) particularly after corneal collagen cross linking. Similarly, if she prefers RLE, then toric presbyopia-correcting lenses or toric monofocal IOLs set for monovision should be considered, otherwise she will require glasses for the presbyopia or astigmatism.
4. The main risks are corneal endothelial cell loss, glaucoma, iritis, and cataract. The risk of these complications varies depending on the style of IOL:
5. Angle-supported: highest risk of corneal endothelial damage;