

# Corneal wedge resection for Very High Astigmatism post-Keratoplasty

Sohaib A. AdDouri, MD

FICMS, ICO

Ibn alHaitham Teaching Eye Hospital, Baghdad, IRAQ

*No financial disclosure ...*

# Successful Graft?

- Clarity
- Optical Performance:
  - Average astigmatism of 4-6D<sup>1</sup>
  - 15-31% >5D of cylinder<sup>2</sup>

---

<sup>1</sup>Riddle HK Jr, Parker DA, Price FW Jr. Curr Opin Ophthalmol. 1998;9(4):15-28.

<sup>2</sup>Javadi MA, Motlagh BF, Jafarinasab MR, et al. Cornea. 2005;24(8):941-946.

# Causes?

- **Host factors:**

Peripheral corneal thinning or ectasia, Scleral ectasia, Scarring, Aphakia, Wound healing, Wound edge profile, Epithelial healing, Shape, Postoperative melting, Vascularization

- **Donor factors:**

Age, Diameter, Intrinsic astigmatism, Edge profile, Shape

- **Surgical factors:**

Suture tension, Suture length, Suture depth, Suture radially, IOP, Suture technique, IOL implantation, Surgeon experience, Trephine quality, sharpness, tilt, Scleral ring placement, Graft size, Graft-host size discrepancy

- **Donor-host interaction:**

Override/underide, Wound healing, Postoperative trauma

# Management?

- Glasses & Contact Lenses

- Suture-in:

selective suture removal and/or suture adjustment along the **steep** meridian

- Suture-out:

**All sutures should be removed**, ensuring **stable** topography and refraction before undertaking any surgical intervention

- Excimer Laser
- Toric Intraocular Lenses
- Astigmatic Keratotomy (up to 15D)<sup>1</sup>
- Intra-corneal rings<sup>2</sup>
- Wedge Resection (up to 25D)<sup>3</sup>

---

<sup>1</sup>Wilkins MR, Mehta JS, Larkin DF. *J Cataract Refract Surg.* 2005;31(2):297-301

<sup>2</sup>Arriola-Villalobos P, Díaz-Valle D, Güell JL, et al. *J Cataract Refract Surg.* 2009;35(11):1878-1884.

<sup>3</sup>Ezra DG, Hay-Smith G, Mearza A, Falcon MG. *Cornea.* 2007;26(7):819-825.

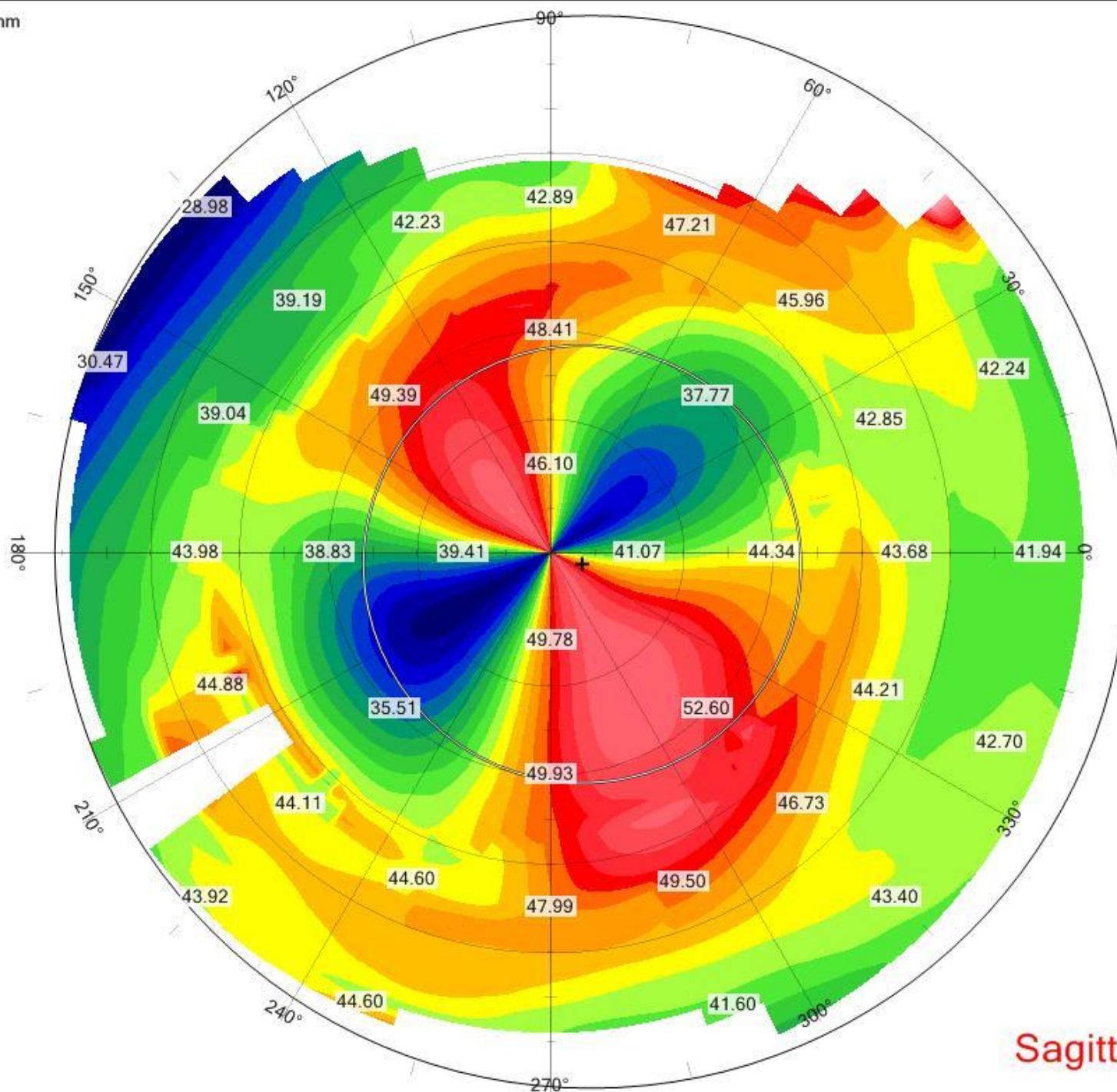
# Case ...

- Twenty-five yrs old lady with KC, had OU CXL then later on OS PKP, all stitches removed 3yrs ago
- Refraction on presentation:
  - OD 6/9p>>-1.0@80 >> 6/9
  - OS CF 5m >> -7.0@35 >> 6/60
- Complains of chronic headache
- Topo on presentation shows ....

x = -1.26 mm, y = 5.18 mm

n0 = 1  
n1 = 1.3375

- 65.50
- 64.00
- 62.50
- 61.00
- 60.50
- 58.00
- 56.50
- 55.00
- 53.50
- 52.00
- 50.50
- 49.00
- 47.50
- 46.00
- 44.50
- 43.00
- 41.50
- 40.00
- 38.50
- 37.00
- 35.50
- 34.00
- 32.50
- 31.00
- 29.50
- 28.00



Sagittal anterior

OS

15859, ██████ - OS

Birthdate: 08/09/1992  
 Identification code: P2090528246  
 Exam date and time: 28/07/2016 09:44  
 Acquisition date: 28/07/2016 21:46:18

Acquisition quality

Summary Indices

**Horizontal Visible Iris Diameter**  
 HVID = 12.06 mm

**+ Pupil (Topographic)**  
 x = 0.35 mm, y = -0.12 mm  
 Ø = 4.92 mm

**◆ Thinnest location**  
 x = -0.56 mm, y = -1.71 mm  
 Thk = 512 µm

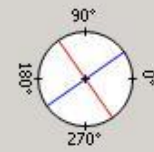
**⊗ Apex**  
 x = -3.14 mm, y = -1.30 mm  
 Thk = 674 µm      Curv = 74.55 D

**Anterior chamber**  
 CCT + AD = 0.542 + 2.99 = 3.53 mm  
 Volume = 145 mm<sup>3</sup>  
 Iridocorneal angle = 42°  
 HACD = 11.94 mm

**Corneal volume (Ø = 10 mm)**  
 Volume = 59.5 mm<sup>3</sup>

K readings (Front)

Sim-K  
 n0 = 1, n1 = 1.3375  
 Sim-K  
 K1 = 33.82 D @ 35°  
 K2 = 57.06 D @ 125°  
 Avg = 42.46 D  
 Cyl = -23.24 D Ax35°



[D]

- Wedge resection was decided ...



# End result:

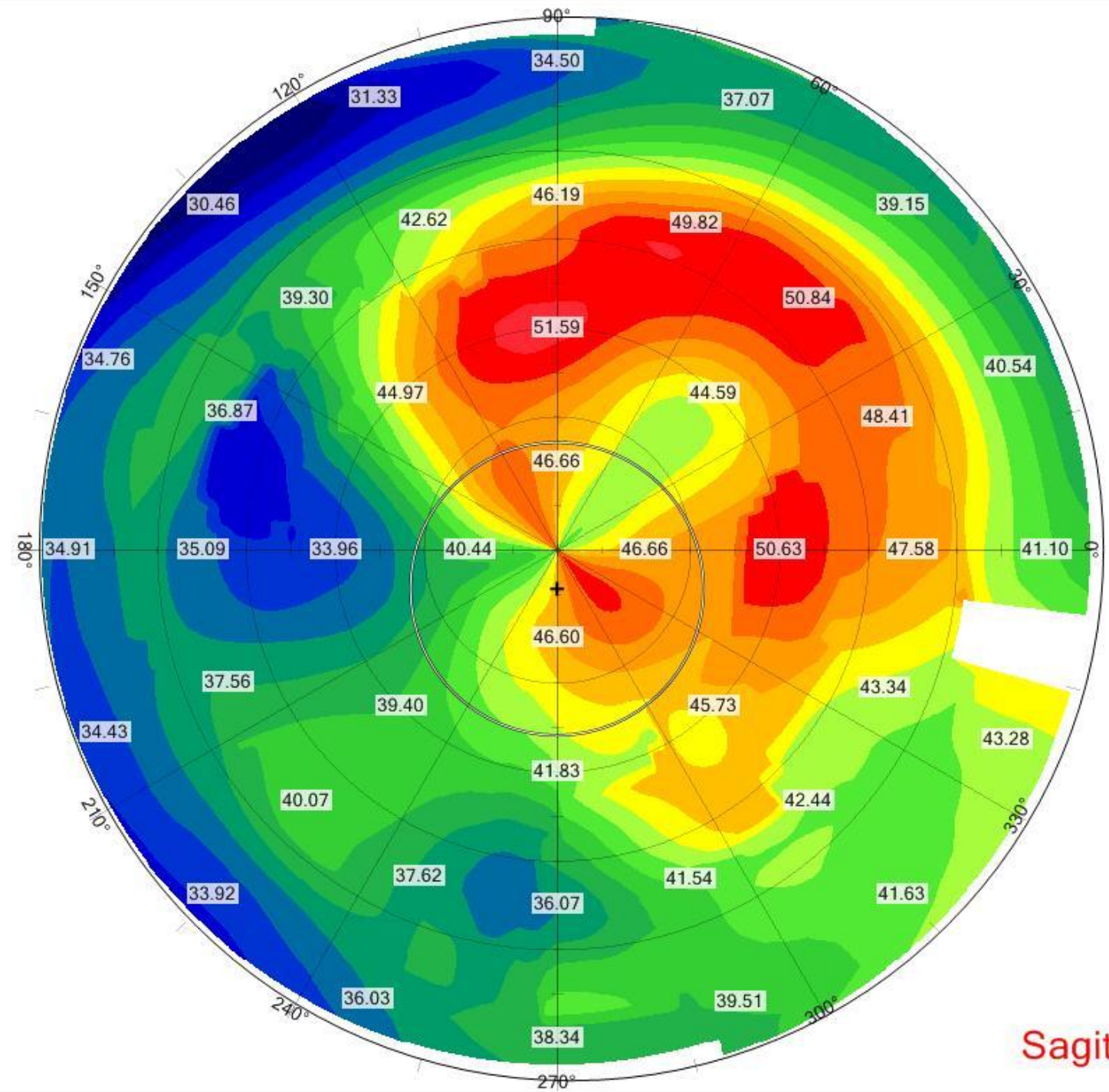
- Refraction almost 14 months later:
  - OD 6/9
  - OS 6/21 >> +3.0/-4.5@35 >> 6/12
- Very happy
- Topo on same day shows ....





65.50  
64.00  
62.50  
61.00  
59.50  
58.00  
56.50  
55.00  
53.50  
52.00  
50.50  
49.00  
47.50  
46.00  
44.50  
43.00  
41.50  
40.00  
38.50  
37.00  
35.50  
34.00  
32.50  
31.00  
29.50  
28.00

n0 = 1  
n1 = 1.3375



OS

15859, [REDACTED] OS  
 Birthdate: 08/09/1992  
 Identification code: P2090528246  
 Exam date and time: 26/09/2017 08:18  
 Acquisition date: 26/09/2017 20:19:54

Acquisition quality

Summary Indices

**Horizontal Visible Iris Diameter**  
 HVID = 11.97 mm

**+ Pupil (Topographic)**  
 x = -0.01 mm, y = -0.43 mm  
 Ø = 3.30 mm

**◆ Thinnest location**  
 x = -0.35 mm, y = -1.15 mm  
 Thk = 523 µm

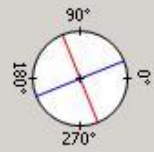
**⊗ Apex**  
 x = 2.21 mm, y = 2.32 mm  
 Thk = 672 µm      Curv = 64.10 D

**Anterior chamber**  
 CCT + AD = 0.545 + 2.82 = 3.36 mm  
 Volume = 134 mm³  
 Iridocorneal angle = 39°  
 HACD = 11.73 mm

**Corneal volume (Ø = 10 mm)**  
 Volume = 59.9 mm³

K readings (Front)

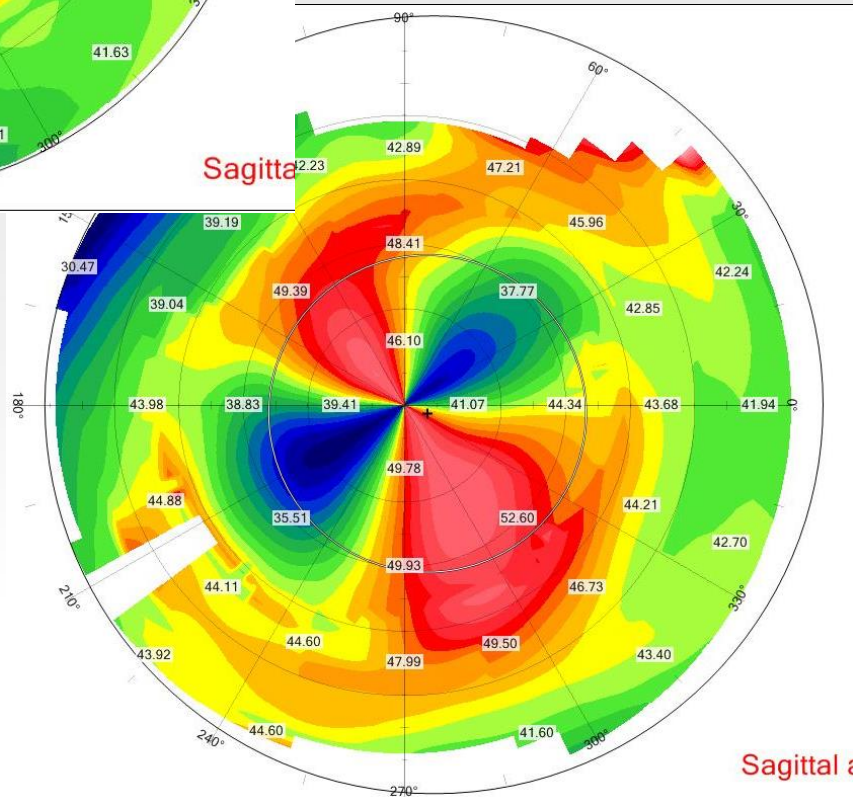
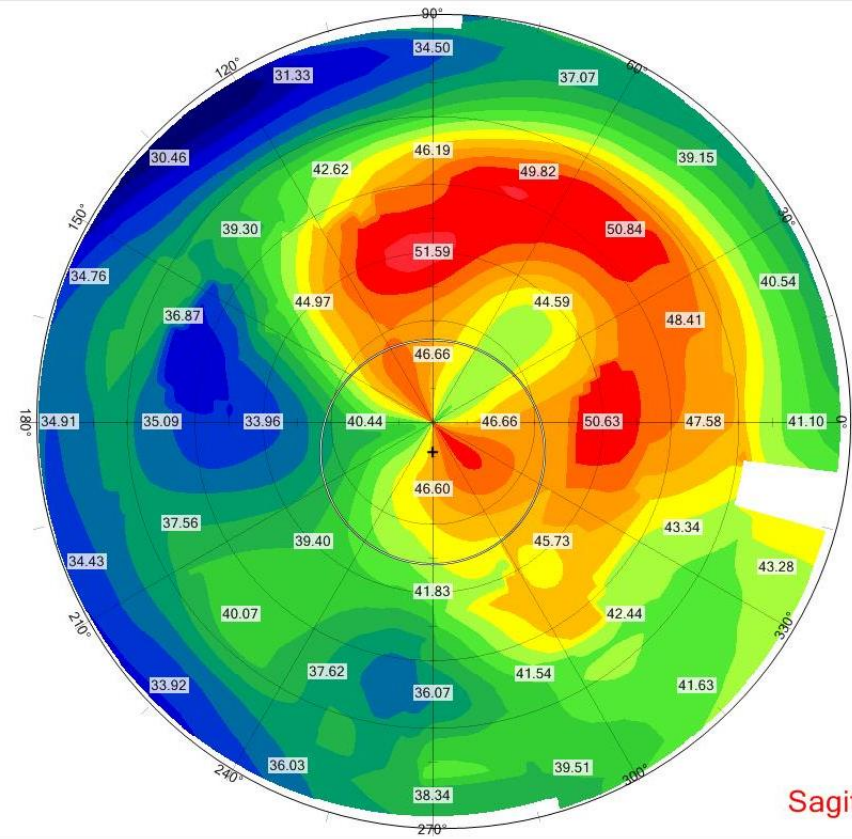
Sim-K  
 n0 = 1, n1 = 1.3375  
 Sim-K  
 K1 = 40.96 D @ 22°  
 K2 = 47.40 D @ 112°  
 Avg = 43.95 D  
 Cyl = -6.44 D Ax22°



Sagittal anterior

[D]



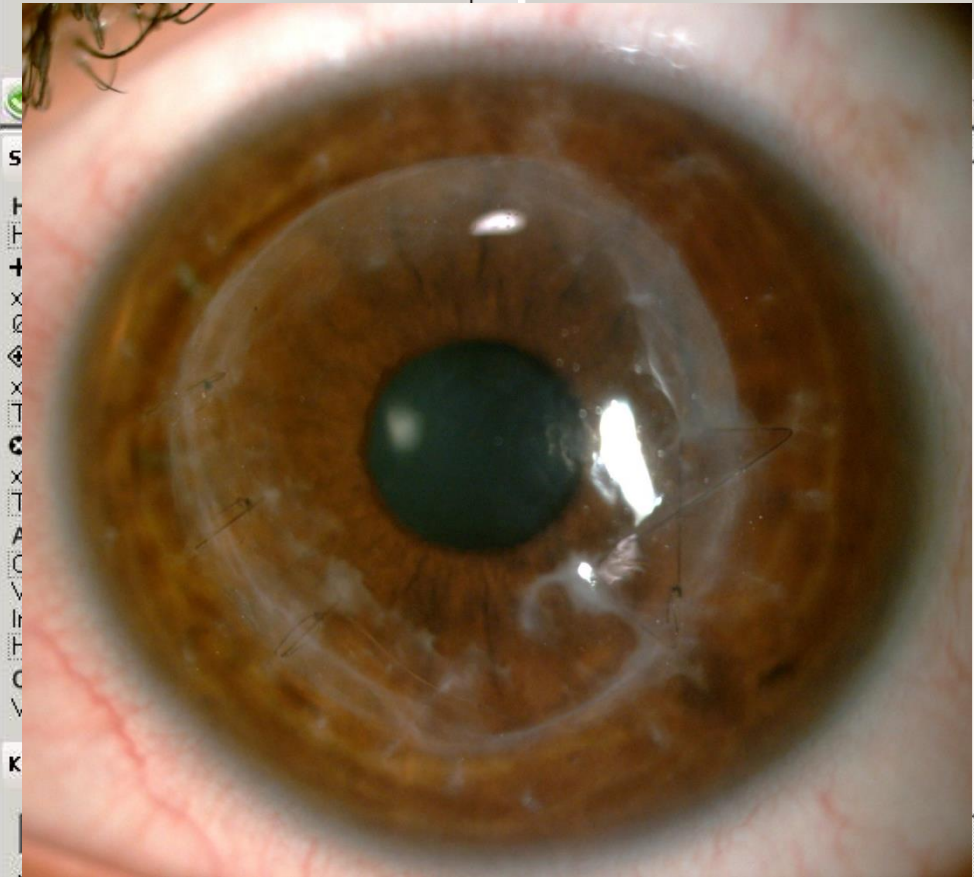


15859, [REDACTED] OS

Birthdate: 08/09/1992  
 Identification code: P2090528246  
 Exam date and time: 28/07/2016 19:44  
 Acquisition date: 28/07/2016 21:46:18

15859, [REDACTED] OS

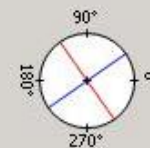
Birthdate: 08/09/1992  
 Identification code: P2090528246  
 Exam date and time: 26/09/2017 08:18  
 Acquisition date: 26/09/2017 20:19:54



$n_D = 1, n_1 = 1.5375$

Sim-K

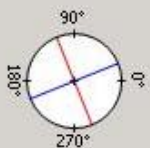
K1 = 33.82 D @ 35°  
 K2 = 57.06 D @ 125°  
 Avg = 42.46 D  
 Cyl = -23.24 D Ax35°



$n_D = 1, n_1 = 1.5375$

Sim-K

K1 = 40.96 D @ 22°  
 K2 = 47.40 D @ 112°  
 Avg = 43.95 D  
 Cyl = -6.44 D Ax22°

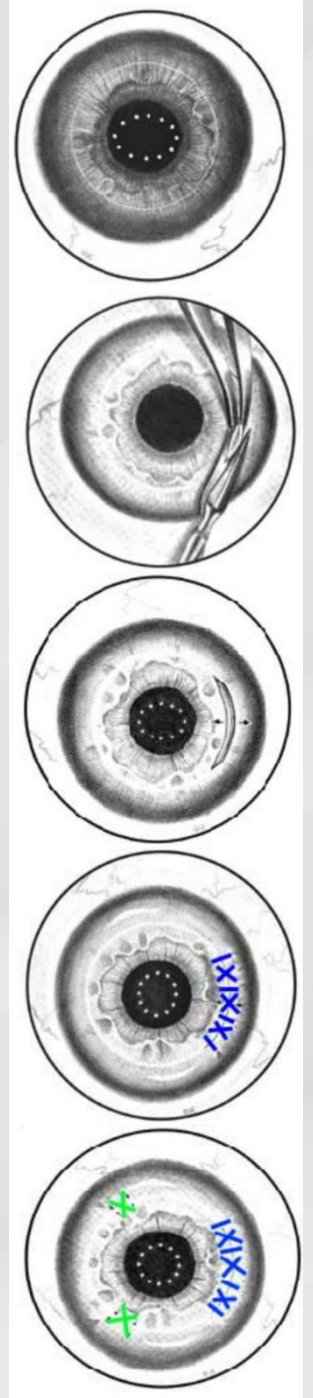


THALMANCE

Sagittal a

# Wedge Resection:

- 0.1mm = 1D
- **Candidates:** reserved for the very high corneal astigmatism
- Removal of wedge-shaped tissue from graft at the **flattest** meridian
- Incision of 60°-90°
- Penetration
- Initial over-correction is aimed at
- 2 compression sutures are applied 120° from flat axis
- Leave sutures for 6-12 months
- Double-blade diamond knife, FS Laser



# References

- Examination & Imaging were done in my private clinic (Dr. Sohaib Ahmed eye clinic). Topographer: Sirius (CSO - Italy)
- Surgical intervention in Ibn alHaitham Eye Teaching Hospital
- Riddle HK Jr, Parker DA, Price FW Jr. Management of postkeratoplasty astigmatism. *Curr Opin Ophthalmol.* 1998;9(4):15-28. doi:10.1097/00055735-199808000-00004
- Javadi MA, Motlagh BF, Jafarinasab MR, et al. Outcomes of penetrating keratoplasty in keratoconus. *Cornea.* 2005;24(8):941-946. doi:10.1097/01.icc.0000159730.45177.cd
- Wilkins MR, Mehta JS, Larkin DF. Standardized arcuate keratotomy for postkeratoplasty astigmatism. *J Cataract Refract Surg.* 2005;31(2):297-301. doi:10.1016/j.jcrs.2004.07.025
- Arriola-Villalobos P, Díaz-Valle D, Güell JL, et al. Intrastromal corneal ring segment implantation for high astigmatism after penetrating keratoplasty. *J Cataract Refract Surg.* 2009;35(11):1878-1884. doi:10.1016/j.jcrs.2009.05.060
- Ezra DG, Hay-Smith G, Mearza A, Falcon MG. Corneal wedge excision in the treatment of high astigmatism after penetrating keratoplasty. *Cornea.* 2007;26(7):819-825. doi:10.1097/ICO.0b013e318093de39