

Cheratocono, Anelli Intrastromali e Banca degli Occhi

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Author has *no financial interest* in the subject
matter of this presentation

ICRS or CAIRS

★ **PMMA Intrastromal Corneal Ring Segments**

★ **Corneal Allogenic Intrastromal Ring Segments**

ICRS

AJL pro+
ASYMMETRIC

PRODUCT

AJL Pro+

DOCTOR

SEGMENT 1

Reference: CW25160

Segment: 160°/250µm

FEMTOSECOND PARAMETERS

Depth: 350 µm

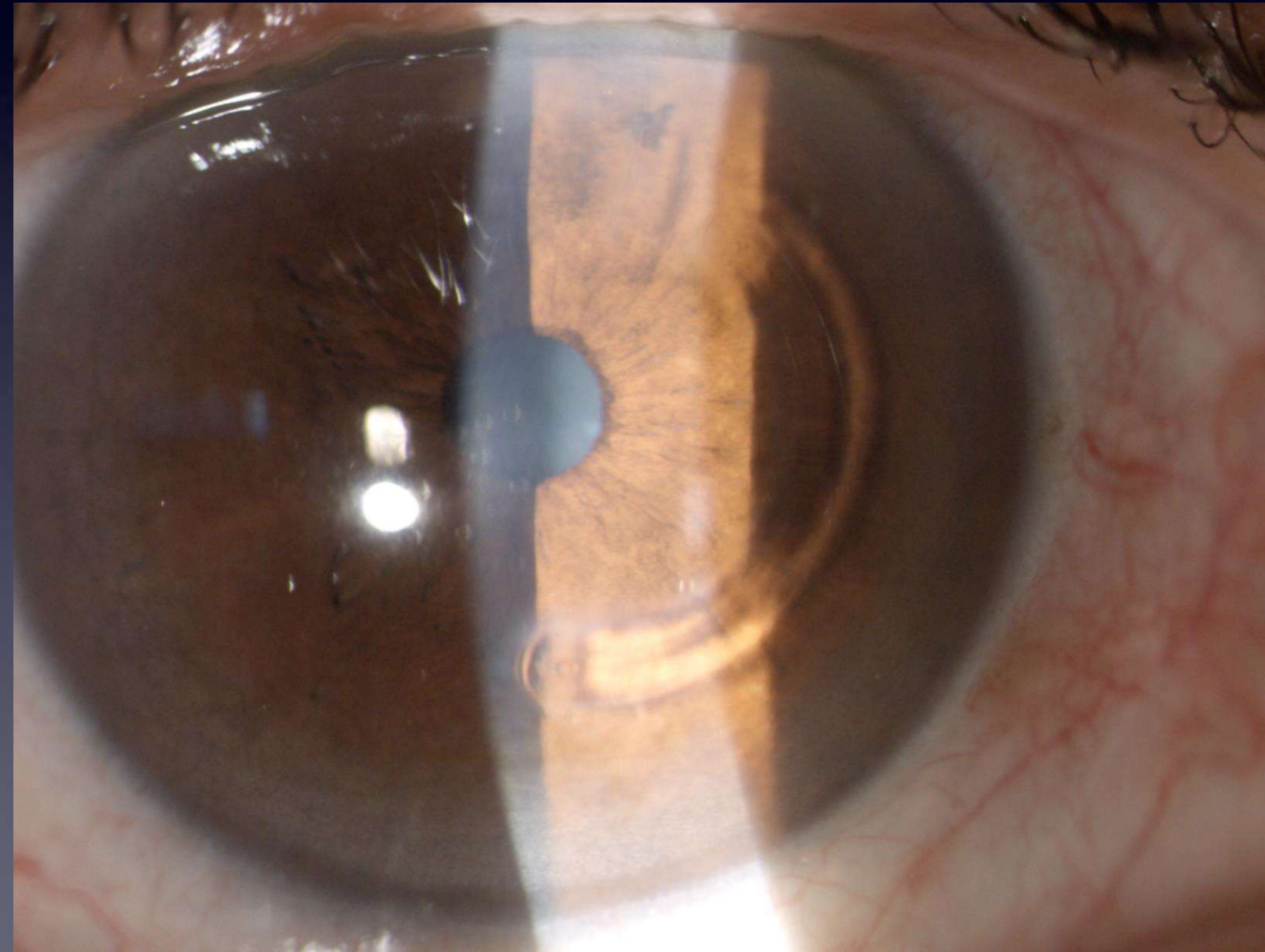
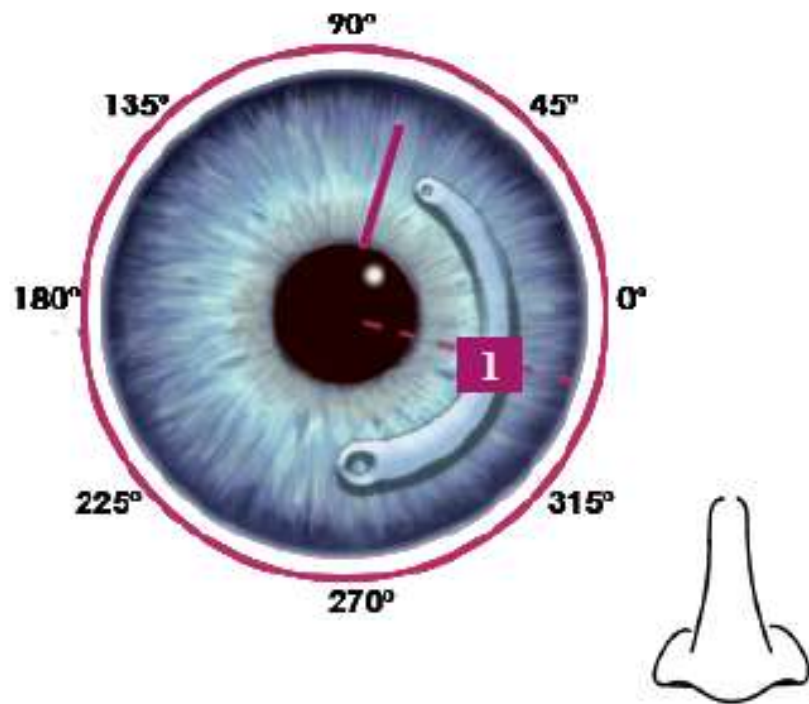
Int. Diameter: 5 mm

Ext. Diameter: 5.7 mm

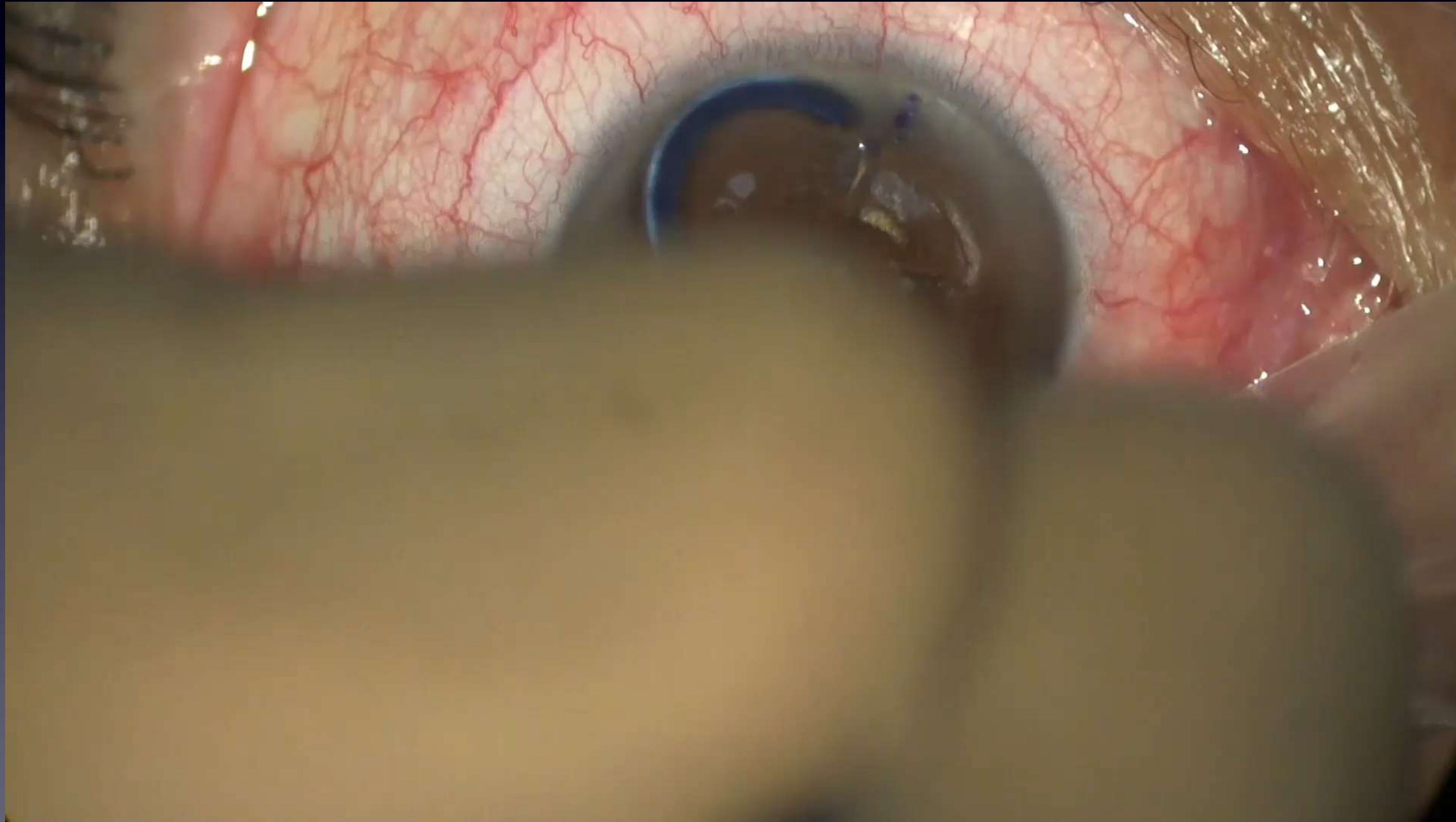
Incision: 74°

Middle: 339°

Ref. Segment 1: CW25160



ICRS



CAIRS versus ISCRS

CAIRS Advantages

- ★ More superficial implantation
- ★ Minimal risk of extrusion, or melting
- ★ Customized arc length, thickness, shape

CAIRS: Preparation

★ **FemtoLaser**

★ **EyeBank**

★ **Size**

★ **Trephine**

★ **Surgeon**

★ **Location**

CAIRS: Eye Bank Preparation

USA Experience

★ CorneaGen, Seattle – CTAK (Corneal Tissue Addition Keratoplasty)

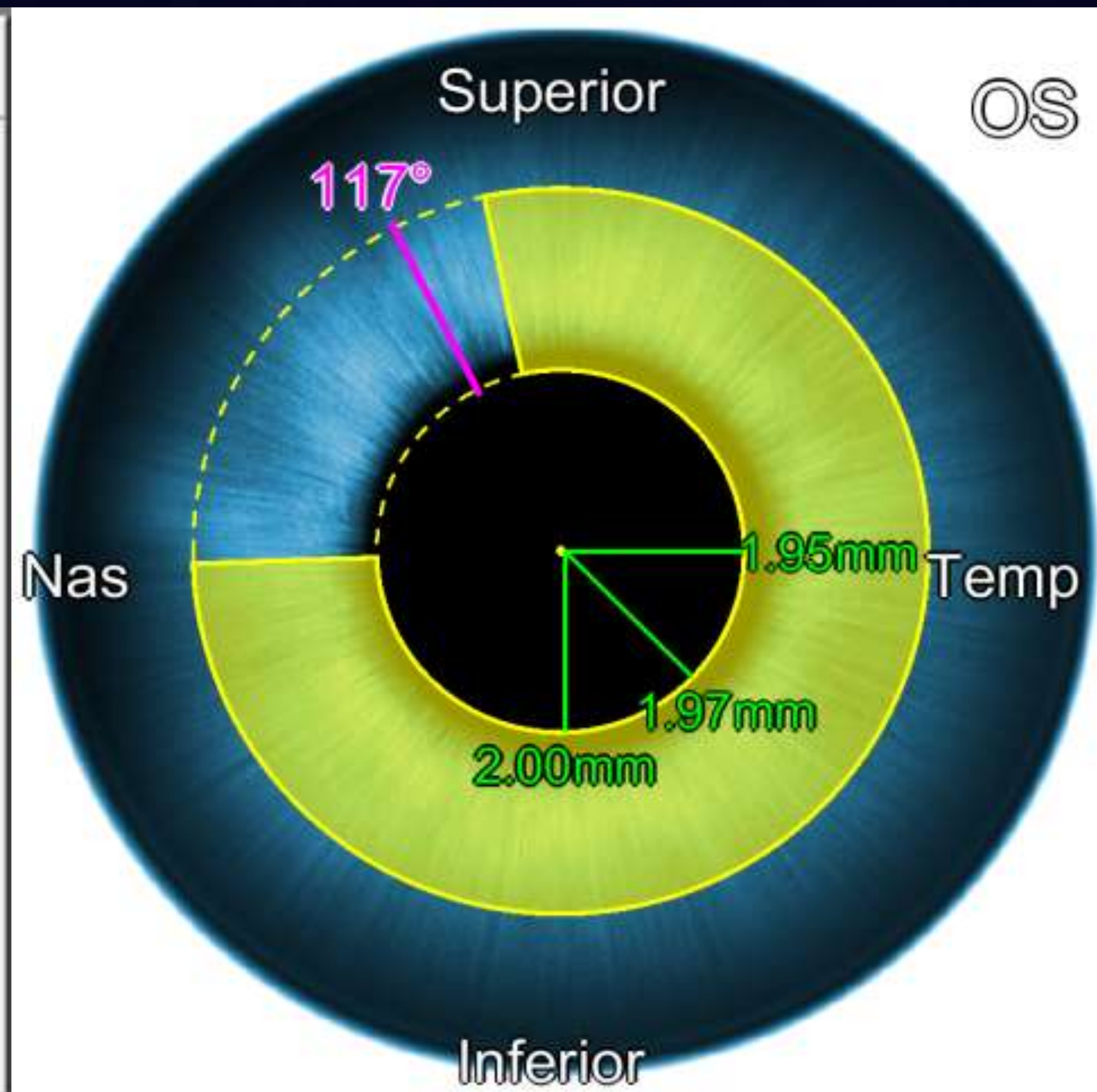
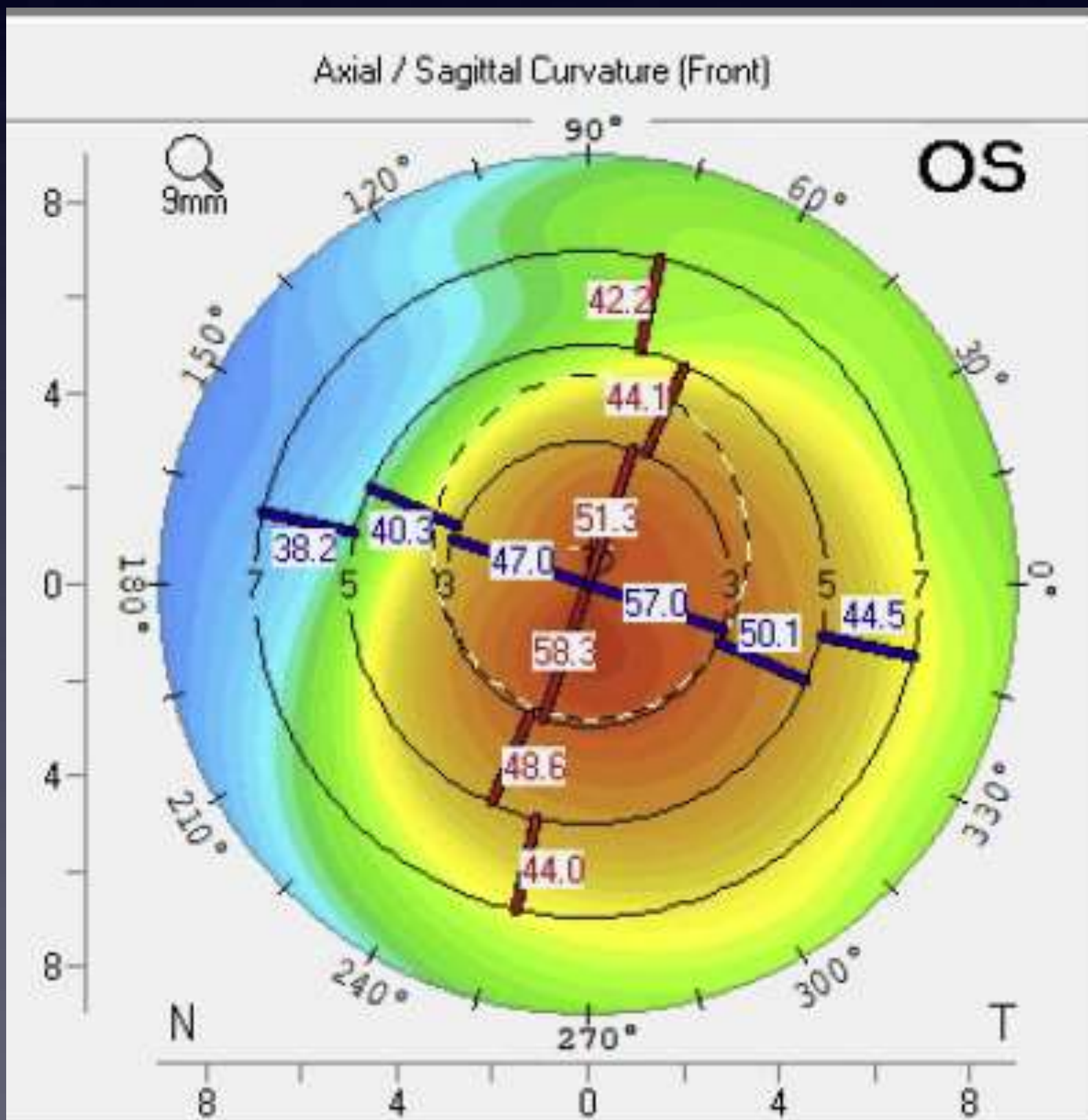
★ Lions World Vision Institute, Tampa - OptiGraft
(Sterile, laser-prepared allogenic ring segments)

CAIRS

CAIRS: Eye Bank Preparation

Patient Topography

CTAK EyeBank Plan



CTAK Design Options

Parameter	Recommended (*)
CTAK Inner Diameter	4.00 mm
CTAK Outer Diameter	8.00 mm
CTAK Thickness	400 um
CTAK Length	280 deg

Recommended Surgical Specifications

CTAK Edge 1 Angle	102 deg
CTAK Edge 2 Angle	182 deg
Incision Angle	117 deg
Incision/Channel Depth	200 um

CAIRS: Surgeon Preparation

★ Brisbane Nomogram:

Developed by Australian surgeons (Drs. Brendan Gunn and Brendan Cronin), this is a highly precise nomogram integrated into digital planning tools like [CAIRSPlan](#). It accounts for the varying severity of keratoconus (mild to severe)

★ Istanbul Nomogram:

A method that frequently relies on a standardized (160°) arc length, customizing the treatment based on the patient's corneal diameter, cone location, and cone size.

★ Jacob Nomogram:

Conceived by the pioneers of CAIRS (Dr. Soosan Jacob), this strategy factors in cone eccentricity, keratometry (K) values, and asymmetric topographical patterns to tailor the tissue dimensions.

CAIRS: Online Calculators

The screenshot displays the CAIRS PLAN web application interface. The main area features a circular keratometry map with a color scale from 10.0 to 90.0 D. The map shows several data points and a central crosshair. A legend in the bottom-left corner provides the following data:

- K1: 43.82 D @ 131°
- K2: 46.02 D @ 41°
- Km: 44.92 D
- Cyl: 2.19 D @ 41°

The right-hand side of the interface contains several control panels:

- SEGMENT SOURCE:** Radio buttons for Femto (selected), Irepine, and Precut.
- NOMOGRAM:** Radio buttons for Brisbane (selected), Istanbul, and Awwad.
- Size:** A dropdown menu set to "Large (55-63 D)".
- SEGMENT POSITION:** A toggle for "Two segments" (disabled). Sliders for "Seg Axis" (set to 270°) and "Length 1" (set to 120°).
- SEGMENT DIMENSIONS:** A "Reset" button. Radio buttons for SEG 1: Standard (selected), Tapered, and Custom. Input fields for Width μm (1000), Thick μm (550), and Area mm^2 (0.550).
- CHANNEL DIMENSIONS:** A toggle for "Manual" (disabled) and "Femto" (selected). Input fields for Inner \varnothing mm (4,50), Outer \varnothing mm (7,10), Width mm (1.30), and Depth μm (250).
- INCISIONS:** A toggle for "Linked" (disabled) and "Femto" (selected). Input field for Incision 1 (set to 0°).

CAIRS: Preparation

test prova
31.03.2026

VAC: 0:50 OS OD

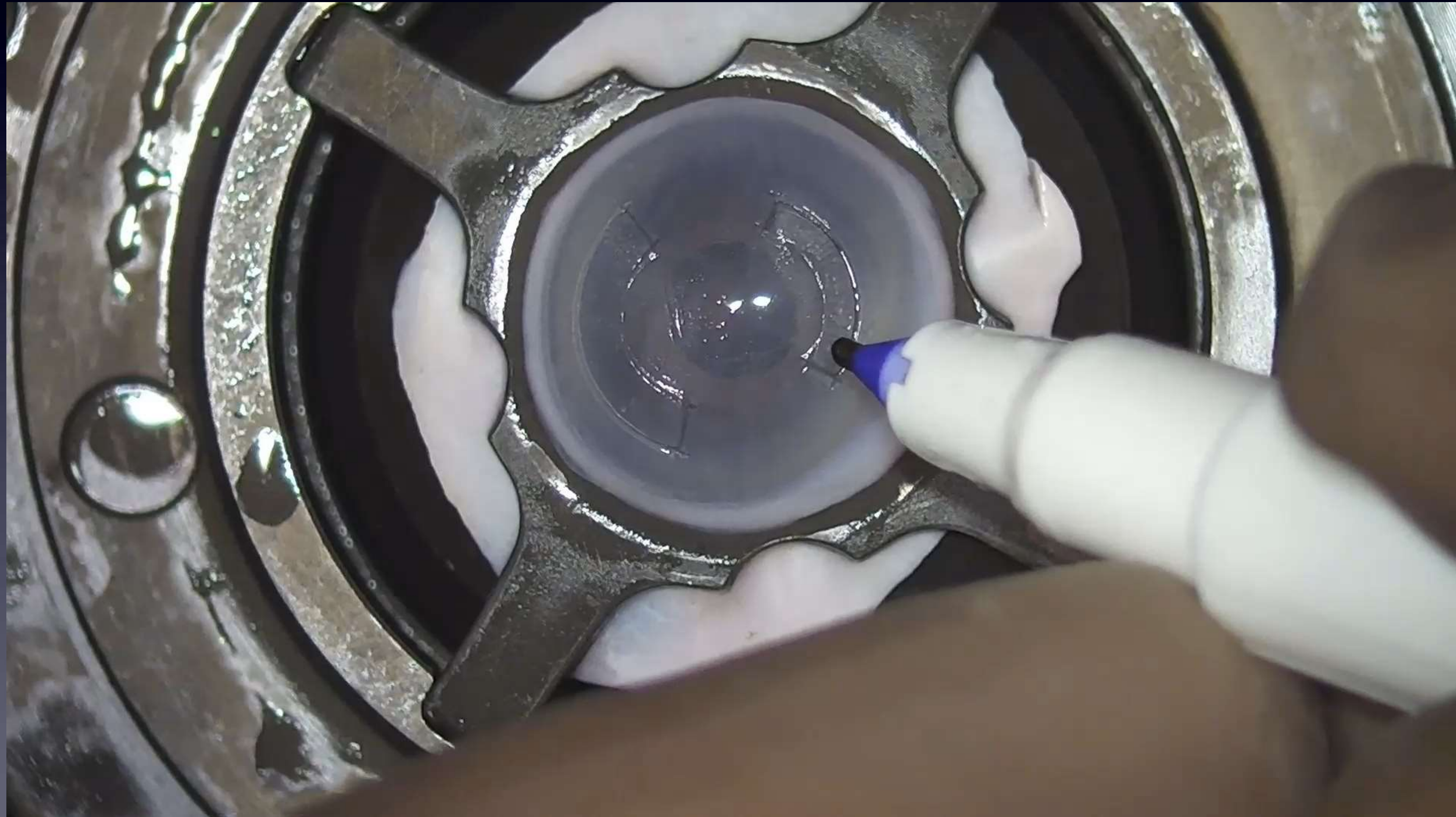
Segment 1
Inner Diameter [mm]
5.0
Width [mm]
1.50
Thickness [μm]
350
Arc Length [$^\circ$]
120 @ 5.0 mm
Cut Diameter [mm]
5.9

Reset

System 0 Abort

ziemer OPTHALMOLOGY

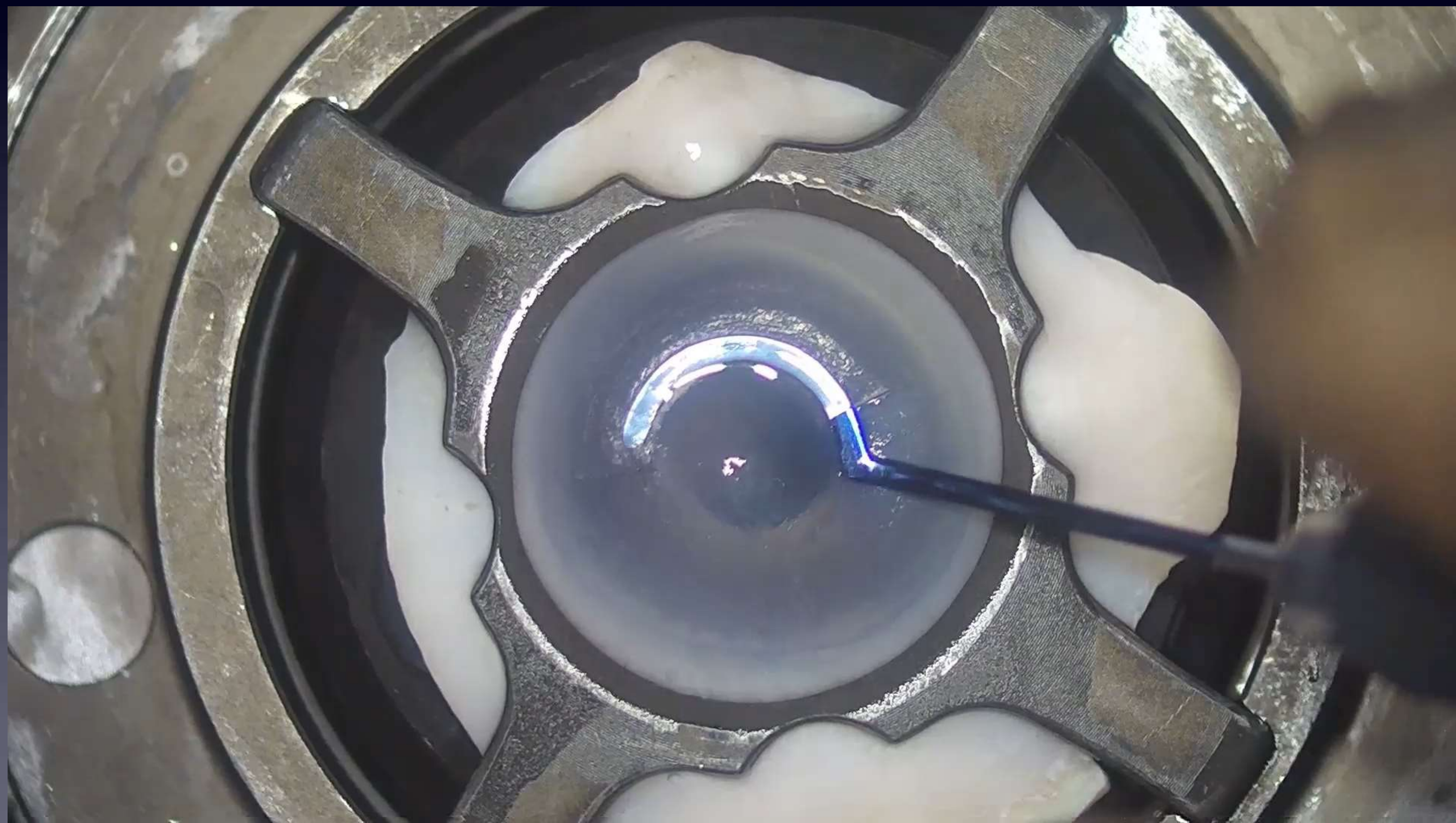
CAIRS: Preparation



CAIRS: Insertion

- ★ CAIRS is not as rigid as PMMA Segment
- ★ CAIRS may twist during insertion
- ★ CAIRS will expand over time
- ★ CAIRS may be oriented differently (bowman up – bowman sideways)

CAIRS: Insertion



CAIRS & EyeBanks: Conclusion

Advantages of EyeBanks CAIRS Preparation:

- ★ Use of tissue not suitable for transplantation
- ★ One donor cornea for more patients, potentially
- ★ Less Transplants needed for corneal ectasia
- ★ More surgeons approaching CAIRS rather than ICRS

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Grazie

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Key Differences at a Glance

	CAIRS	ICRS
Material	Human donor corneal tissue (allogenic)	Rigid synthetic polymers (PMMA, etc.)
Biocompatibility	Integrates naturally into the host corneal stroma	Foreign body; does not integrate with host tissue
Implantation Depth	Can be implanted much shallower	Must be placed deep in the stroma (approx. 80%)
Complication Risk	Very low risk of extrusion, tissue melt, or necrosis	Higher risk of segment migration, erosion, or corneal melt
V		
Revision Options	Can be easily replaced, exchanged, or even stacked	Requires surgical removal and potential tunnel re-creation

CAIRS versus ISCRS

CAIRS

ICRS

	CAIRS	ICRS
Depth	More superficial implantation	Deep stromal implantation (75-80%)
Complication	Minimal risk of extrusion, or melting	Higher risk of tissue erosion or melting
Customization	Tailored arc length, thickness, shape	Standardized, pre-manufactured sizes