

FLACS + 27G VITRECTOMY, PERFECT COMBINATION

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- I Have no direct financial or proprietary interest in any of the companies or services mentioned in this presentation**

WHAT IS A FEMTOSECOND LASER?

- **Optical pulses with a duration in the range of femtoseconds (1 fs = 10^{-15} seconds)**
- **Allows for precise cutting of tissue with minimal collateral damage**
- **Utilized since 2001 in ophthalmologic procedures such as LASIK, corneal transplants**

COMMERCIALLY AVAILABLE SYSTEMS

- **Alcon LenSx®** (approved for all steps)
- **LensAR®** system (approved for all steps)
- **OptiMedica Catalys®** (approved for all steps)
- **B+L Victus®** (approved for corneal flaps, incisions and anterior capsulotomy)
- **AMO Intralase® FS** (used in LASIK flaps, approved for arcuate incisions only)

ALCON LENSX



HOW IS A FEMTOSECOND LASER USED TO ASSIST IN CATARACT SURGERY?

- Currently, FDA-approved for 3 steps:
 - All corneal incisions
 - Anterior capsulotomy
 - Lens fragmentation
- But, why is this important?

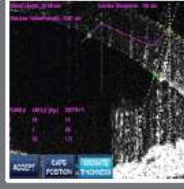
FEMTO-LASER-ASSISTED CATARACT SYSTEM



IOL Position Predictability

- Uniform Shape and Size Capsulotomy

Norby S.J. J Cataract Refract Surg 2008;34:368–376



Corneal Astigmatism

- Reproducible Corneal Entry and Arcuate Incisions

Hill W.J. J Cataract Refract Surg 2008;34:364–367



Early Wow Factor

- Reduced Phaco Power and Corneal Edema

Devgan U. Current Opinions in Ophthalmology 2011;18:19–22



SOFT FIT PATIENT INTERFACE

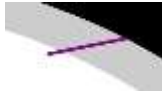
- A disposable, single-use, soft contact lens is used to dock with the patient's eye.
- Curved interface is designed for patient comfort, ease of use
- Surgeons dock the PI using the video microscope and integrated real-time OCT.
- The unique shape of the patient interface helps maintain a more natural curvature of the patient's cornea. This helps to improve surgical accuracy during FLACS



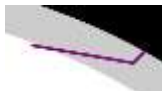
CORNEAL INCISIONS

- Primary and secondary incisions (including arcuate incisions) can be created
- Size and degree of each incision and its orientation are customizable

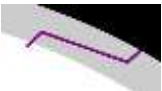
Single-plane cut



Two-plane cut



Three-plane cut

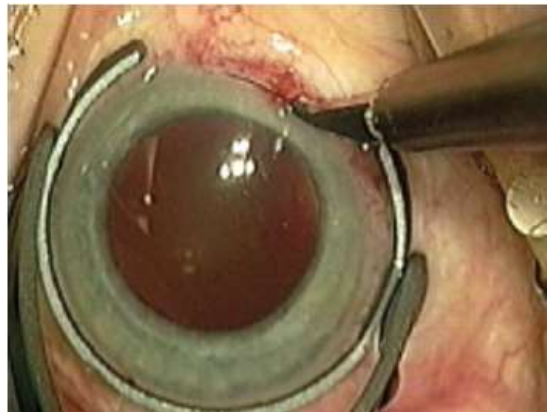


Customized wound architecture and placement

Self-sealing incisions

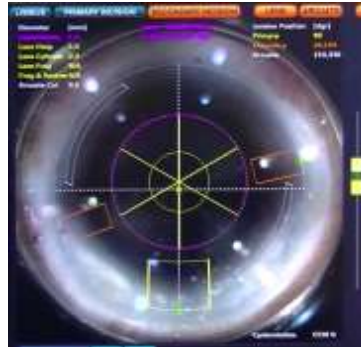
ARCUATE INCISIONS

- Manually created using handheld diamond blade
- Inconsistent depth control
- Risk of perforating cornea
- Unpredictable effect due to imprecise wound architecture and depth
- No image-guided planning or visualization



LASER ARCUATE INCISIONS

- Image-guided surgical planning with OCT
- Real time corneal thickness
- Computer-customized incisions
 - % depth
 - Incision length and position
 - 3D visualization of incision placement
- Predictable incision width
- Titratable incisions:
(adjustable intraoperatively and post-operatively in office)

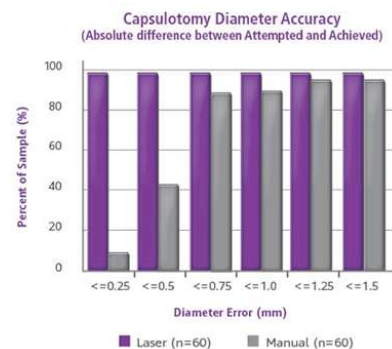


ANTERIOR CAPSULOTOMY

- Only 10% of manually created capsulorhexis achieved a similar diameter accuracy of +/-0.25 mm vs. nearly 100% of LenSx procedures

Continuous and perfectly curvilinear

Potentially stronger : ↓ anterior capsular tears



Nagy, ZZ. 1-year clinical experience with a new femtosecond laser for refractive cataract surgery. Paper presented at: Annual Meeting of the American Academy of Ophthalmology; October 24-27, 2009; San Francisco, CA.

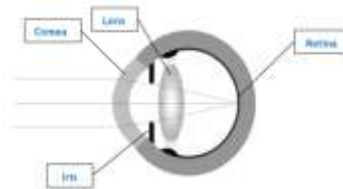
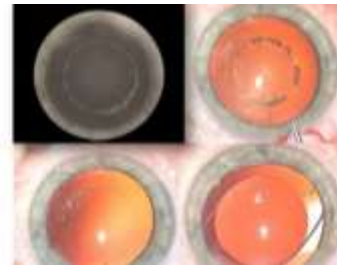
Nagy, ZZ. Intraocular femtosecond laser applications in cataract surgery. *Cataract & Refractive Surgery Today*. September 2009:79-82.

EFFECTIVE LENS POSITION

"The key to highly accurate IOL power calculation is being able to correctly predict ELP for any given patient and IOL"

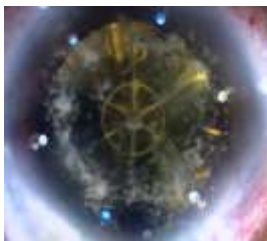
Studies show that the size of capsulorhexis affects ELP

Capsulorhexis needs to be round, centered, and just smaller than the IOL optic diameter

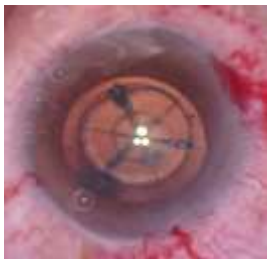


Haigis W et al. Comparison of immersion ultrasound biometry and partial coherence interferometry for IOL calculation. *Graefes Arch Clin Exp Ophthalmol*, 2000;238:765-73
 Cekic O, Batman C. The relationship between capsulorhexis size and anterior chamber depth relation. *Ophthalmic Surg Lasers*, 1999;30(3):185-90
 Hill WE. Hitting Emmetropia. Chang D. (ed) In: *Mastering Refractive IOLs – The Art and Science*. Slack, Incorporated, 2008
 Hill WE. Does the Capsulorhexis Affect Refractive Outcomes? Chang D. (ed) In: *Cataract Surgery Today*, Bryn Mawr Communications, Wayne, Pennsylvania 2009, p.78

LENS FRAGMENTATION



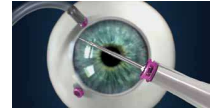
- The femtosecond laser performs lens fragmentation, creating easily dissected segments for efficient removal with reduced phaco power.
- Most systems allow the surgeon to set the lens fragmentation pattern, from pie cuts to complete liquefaction.



27G SUTURELESS TRANSCONJUNCTIVAL SYSTEM

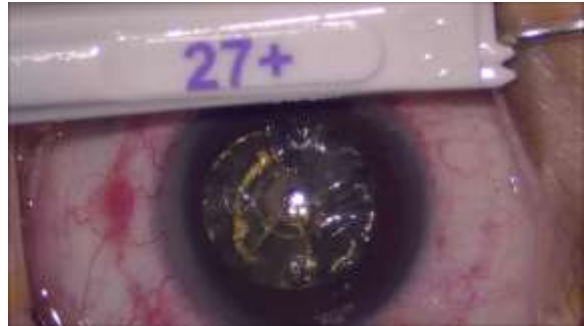
In 2010,

- Oshima introduced 27-gauge instrumentation with a diameter of 0.4 mm,



Benefits:

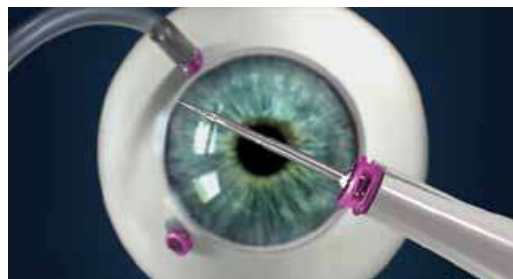
- Smaller-gauge instrumentation and high cutting rate is safer
- Increase fluidics stability
- Minimize vitreous turbulence by allowing small bits of vitreous into the port



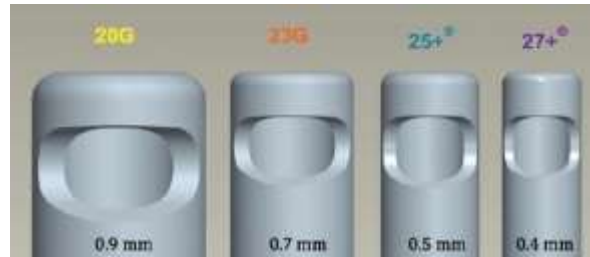
27G SUTURELESS TRANSCONJUNCTIVAL SYSTEM

Pros:

- Interchangeability of instruments at entry sites-protect vitreous base from mechanical traction.
- Smaller wounds - self-seal and prevent hypotony
- Reduced corneal astigmatism
- Diminished conjunctival scarring
- Less postoperative inflammation
- Improved patient comfort
- Earlier visual recovery
- Increase fluidics stability
- Minimize vitreous turbulence by allowing small bits of vitreous into the port



27G SUTURELESS TRANSCONJUNCTIVAL SYSTEM



• Merits:

- Port close to the end of the probe (0.2 mm).
- Allow access to preretinal membranes (dissection instrument)
- Dugel et al- showed that smaller-gauge vitrectomy probes have **shorter membrane attraction distances** and a **reduced "sphere of influence,"** limiting disruption of surrounding tissue and potentially reducing iatrogenic retinal breaks.

Dugel PU, Abulon DJK, Dimalanta R. Comparison of attraction capabilities associated with high-speed, dual-pneumatic vitrectomy probes. Retina. 2015;35:915-920.

27G SUTURELESS TRANSCONJUNCTIVAL SYSTEM

Merits:

- Foldback delamination: putting the cutter port just behind the membrane's leading edge and folding back the membrane into the port with high-speed cutting in shave mode with gentle aspiration
- Thickened membranes can be dissected directly by moving the cutter port forward into the leading edge of membranes while adjusting the port away from the retina to reduce the risk of retinal tissue entering the port



STEVE CHARLES-Retina Today

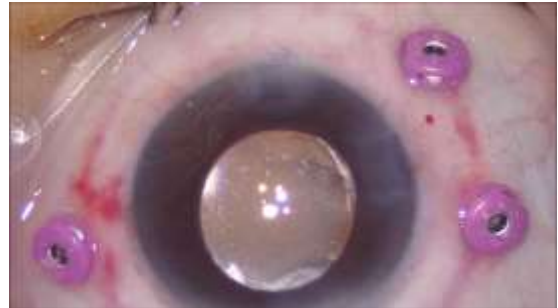


STEVE CHARLES-Retina Today

27G SUTURELESS TRANSCONJUNCTIVAL SYSTEM

Cons:

- Reducing the diameter of a light pipe: is not a concern because current-generation illumination sources fill the eye with light equally and properly as 25 G
- Decreased aspiration force
- Slightly Longer surgical time
- Injection of silicone oil

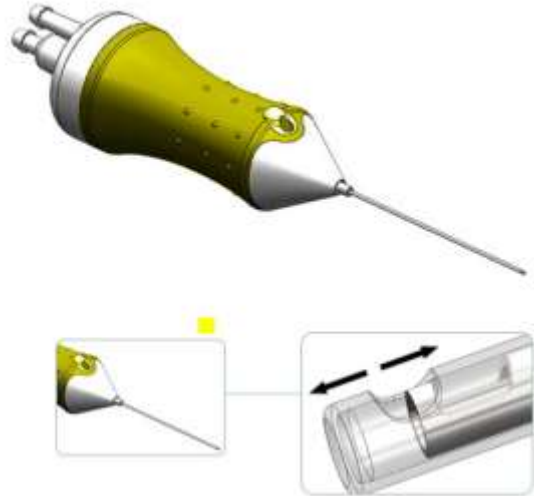


27G SUTURELESS TRANSCONJUNCTIVAL SYSTEM

- Khan et al found that mean operative time by 27G was **(32.00 minutes)** which is not significantly different from the mean operative times of 23-gauge **(31.9 minutes)**
- Mitsui et al compared operative times between 27- and 25-gauge vitrectomy for ERM. The authors found that, while **total overall operative time was not significantly different between 27-gauge and 25-gauge systems (20.2±9.9 vs 16.1±9.3 minutes, respectively, P=.14), mean vitrectomy time was longer with 27-gauge instruments (9.9±3.5 vs 6.2±2.7 minutes, respectively, P<.0001).**

27G SUTURELESS TRANSCONJUNCTIVAL SYSTEM

- New double-port 27-gauge twin-duty cycle (TDC) cutter with cutting rates of up to 6000 to 8000 cpm
- The aspiration flow of the 27-gauge TDC cutter is better than that of the standard 27-gauge cutter by 50%
- Almost equal to or a little bit better than that of a standard 25-gauge cutter



27G SUTURELESS TRANSCONJUNCTIVAL SYSTEM

Indications:

- Macular surgery
- Simple vitreous hemorrhages
- Rhegmatogenous retinal detachment
- Proliferative diabetic retinopathy
- Retained lens fragments
- Subretinal hemorrhage

Contraindication (Relative):

- Use of Silicone oil

Although one Trocar might be replaced at the end of the procedure by 25 or 23 G trocar for silicone injection



27G SUTURELESS TRANSCONJUNCTIVAL SYSTEM

- The 27+ vitrectomy instruments is comparable to The stiffness of 25+
- Dual-pneumatic driven technology, has the ability to achieve 7500 cpm

The 27+ accessories currently include:

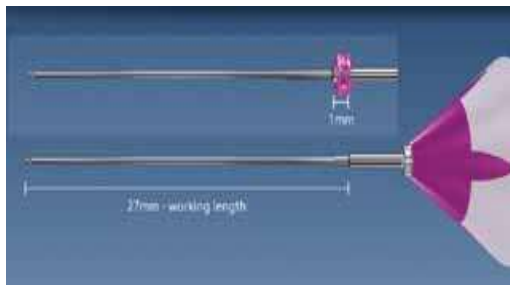
- Internal limiting membrane forceps
- End-grasping forceps
- Maxgrip forceps
- Straight scissors
- Diathermy probe
- Flexible-tip laser probe
- High-flow backflushand soft tip.



27G SUTURELESS TRANSCONJUNCTIVAL SYSTEM



- These instruments have a stiffening sleeve on the shaft for improved control and rigidity



27G SUTURELESS TRANSCONJUNCTIVAL SYSTEM

- (3-D) submode switch different cutting and aspiration settings during vitrectomy using the foot pedal
- This dual setting enables an efficient core vitrectomy with full pedal depression and safer peripheral shaving by releasing the foot pedal to allow proportional control of the aspiration for retinal detachment surgery with the 27+ system
- 2 cutter delamination. The surgeon can switch between the 2 techniques quickly by rotating or repositioning the cutter port while changing the pedal depression to select the preferred cutting setting depending on the thickness and fragility of the fibrovascular membranes



PERFECT COMBINATION

- **Combining both FLACS & 27 G is a very handy tool for getting extremely safe and accurate results**



THANK YOU

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