Glaucoma Treatment Update 2026

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Financial Disclosures

- None whatsoever

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Learning Objectives

- Discuss existing and emerging medical treatment options for glaucoma
- Discuss existing and emerging surgical treatment options for glaucoma
- Introduce "Interventional Glaucoma" as an improved approach toward patient management

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Glaucoma Prevalence Is Increasing

- Glaucoma is the second leading cause of blindness worldwide
- In the US, there are more than 3 million cases of glaucoma, growing to more than 6.3M cases by 2050



1. Friedman DS, De Jong PT, Klein BE, et al. Glaucoma prevalence in the United States: results of a meta-analysis. American Glaucoma Society Annual Meeting 2003; Abstract.

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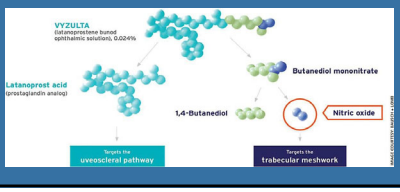
Emerging Medical Treatments

- Recently Released Drops
  - Latanoprostene (Vyzulta)
  - Netarsudil (Rhopressa)
  - Netarsudil/Latanoprost (Rocklatan)

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Latanoprostene

- Vyzulta
  - Once daily dosing
  - Dual mechanism
    - Uveoscleral
    - Trabecular Meshwork
  - Mean IOP reduction 7.5 to 9.1 mmHg from baseline
  - 32% reduction in mean diurnal IOP



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Netarsudil

- Rhopressa
  - Rho kinase inhibitor
  - Once daily dosing
  - Increases outflow through Trabecular Meshwork
  - Up to 5 mmHg reduction in Mean IOP from baseline (<25 mmHg)
  - 53% of patients experienced hyperemia

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Netarsudil/Latanoprost

- Rocklatan
  - Once daily dosing
  - Up to 9 mmHg reduction in Mean diurnal IOP from baseline
  - Up to 36% reduction in mean diurnal IOP
  - 59% of patients experienced hyperemia

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Emerging Medical Treatments

- Pipeline Drops
  - Episcleral Venous Pressure Reduction
    - Cromakalim prodrug 1 (CKLP1)
    - QLS-101
  - EP2 receptor agonist (non-Prostaglandin)
    - Omidenepag isopropyl

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Cromakalim prodrug 1 (CKLP1) and QLS-101

- Lowers episcleral venous pressure and distal outflow
  - EVP is 8-10 in normal eyes and can be higher (10-12) in glaucomatous eyes
  - Minimal effect alone in studies
    - Potential as an adjunct to traditional medications or with MIGS
  - Theoretical value in low tension glaucoma due to lower baseline IOP as well as Sturge-Weber Syndrome

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Omidenepag Isopropyl

- Omlonti
- Approved by FDA in 2022
- Increases trabecular (conventional) and uveoscleral (unconventional) outflow via E-prostanoid subtype 2 receptor
- Efficacy similar to prostaglandin analogs
  - 5-7 mmHg reduction from baseline
- Once daily dosing
- Avoids PAP (Prostaglandin associated periorbitopathy)
- Associated with macular edema
  - Use with caution in pseudophakic/aphakic patients

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Compounded Glaucoma Drops

- Contain one or more of the following agents
  - Prostaglandin analog
  - Beta blocker
  - Carbonic Anhydrase Inhibitor
  - Alpha adrenergic agonist
- Available in preservative-free or lower preservative concentrations
- Cost may be favorable even compared with generic
- Reduced dosing regimen can improve compliance

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Compounded Glaucoma Drops: Concerns

- Combinations are not specifically FDA approved, although components are already approved
- Efficacy data is limited
- Preservative-free limits shelf life
- Must ensure a quality pharmacy

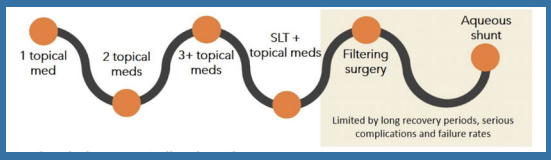
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Drug Quality and Security Act (DQSA – 2013)

- 503A
  - Regulated by state board
  - Can dispense to individuals with specific prescription
- 503B
  - Regulated by FDA
  - Can mass produce, sell to facilities or direct to patients

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Historical Treatment Algorithm

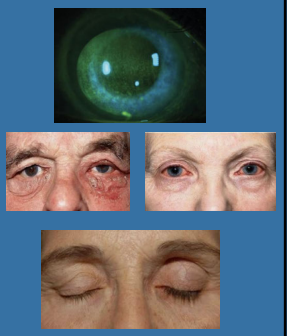


Traditionally, pharmacologic and laser treatments have been the mainstay until disease progression warrants surgical intervention (trabeculectomy/tube shunt) due to the invasiveness and co-morbidities involved

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Challenges

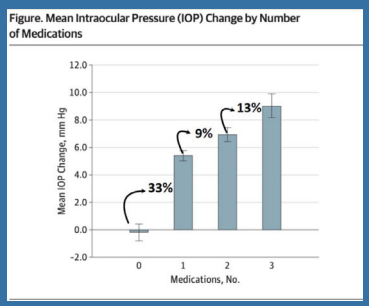
- Ocular surface issues
- Allergies
- Non-compliance to medication
  - More than 90% of patients did not refill medications continuously over a 3 year period, and nearly 50% stop taking their medications before 6 months[1]
- Risks associated with invasive surgery
- Cost burden to patients & system



1. Nordstrom BL. Persistence and adherence with topical glaucoma therapy. Am J Ophthalmol. 2005;140:598-596

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Effectiveness of Additional IOP-Lowering Meds



Jampel et al., JAMA Ophthalmology 2014

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Risk of Progression

- Studies have shown that even patients diagnosed and treated with topical medications can suffer significant disease progression
  - 20-year NIH study showed despite being diagnosed and treated with topical glaucoma medication, the probability of disease progression leading to blindness in at least one eye was 13.5%, and 4.3% bilaterally
- Earlier surgical intervention can slow disease progression more effectively than medical therapy, especially when presenting with more advanced stage

1. Malihi M, Moura Filho ER, Hodge DO, Sit AJ. Long-term trends in glaucoma-related blindness in Olmsted County, Minnesota. Ophthalmology. 2014 Jan;121(1):134-141. doi: 10.1016/j.ophtha.2013.09.003. Epub 2013 Oct 25. PMID: 24823760; PMCID: PMC4038428.
2. Janz NK, Wren PA, Lichter PR, Musch DC, Gillespie BW, Guire KE, Mills RP; CIGTS Study Group. The Collaborative Initial Glaucoma Treatment Study: interim quality of life findings after initial medical or surgical treatment of glaucoma. Ophthalmology. 2001 Nov;108(11):1954-65. doi: 10.1016/s0161-6420(01)00874-0. PMID: 11713062

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Early Manifest Glaucoma Trial (EMGT)

- Newly diagnosed patients with early visual field defects
- 255 patients randomized to laser trabeculoplasty and betaxolol BID or no treatment with close follow up
- After 6 year follow up, progression in treatment group was less frequent and occurred significantly later
- 25 percent IOP reduction reduced rate of progression by 50 percent
- Every 1 mmHg reduction of IOP lowered risk of progression by 10%

Medicare Administrative Claims Data (Carrier 5%- SAF) 2007-2010.

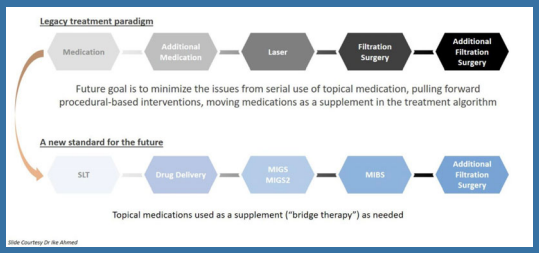
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Interventional Glaucoma

- A proactive approach to managing glaucoma that entails early predictive diagnostics, active monitoring, and procedural interventions earlier in the treatment paradigm
- Reduces the drawbacks of topical medications, including poor compliance and unwanted side effects
- Goal of reducing progression and the need for major incisional surgeries, thereby improving patient quality of life

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Interventional Glaucoma



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Laser in Glaucoma and Ocular Hypertension Trial (LIGHT)

- 718 patients randomized to receive either drops or Selective Laser Trabeculoplasty (SLT)
- Laser group
  - At 3 years more SLT patients were at target IOP compared with the drop group
  - More eyes in drop group exhibited disease progression
    - 26.8% vs 19.6%
  - More cost effective, repeatable
  - Less likely to need incisional surgery

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Emerging Laser Treatments

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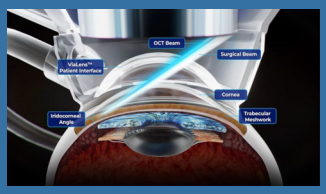
Direct SLT

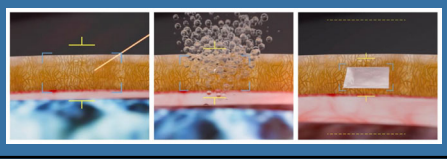
- Eagle SLT
- Automated and non-invasive
  - 120 treatments directly to TM
- GLAUrious Trial
  - Did not prove Non-inferior to conventional SLT at six months
  - 3.20 mmHg mean reduction in IOP at 12 months, which was comparable to conventional SLT

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Femtosecond Laser Image-Guided High-Precision Trabeculotomy (FLIGHT)

- Non-invasive, non-incisional treatment
- 500 x 200-micron channel created through the TM





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Femtosecond Laser Image-Guided High-Precision Trabeculotomy (FLIGHT)



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Sustained Medical Treatments

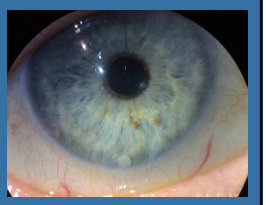
- Long-Acting Medications
  - Intracameral Bimatoprost
  - Intracameral Travoprost



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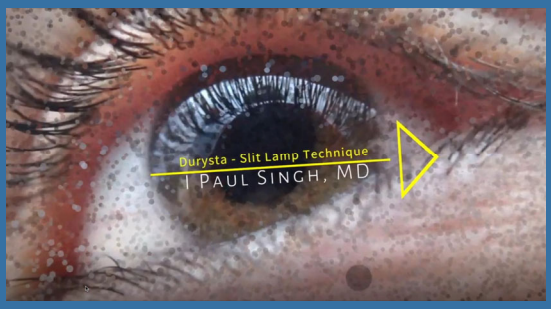
Intracameral Bimatoprost

- Durysta
- ~1mm in length
- Slowly degrades
- ARTEMIS 1 and ARTEMIS 2
  - Non-inferior to timolol BID
  - IOP effects were seen in some patients at month 20



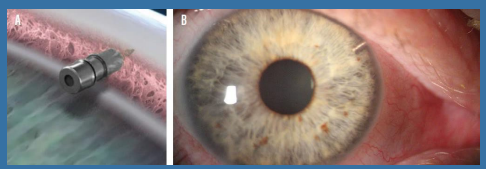
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Intracameral Bimatoprost



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iDose



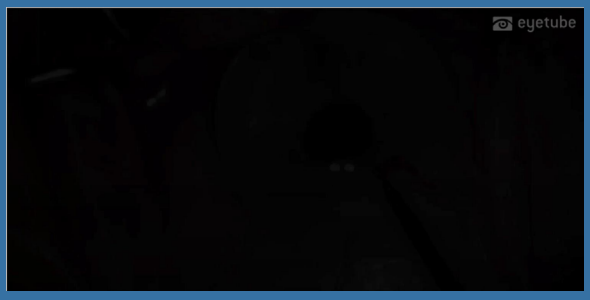
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iDose

- Travoprost intracameral implant
- POAG or OHTN
- At 12 months, 81% of patients were drop free
- Separate trial showed that throughout 2 years the intraocular levels of travaprost were higher than the maximum concentrations from topical travoprost
- Implants had 16 % of travoprost still remaining at 2 years
- Expensive/difficult reimbursement

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iDose



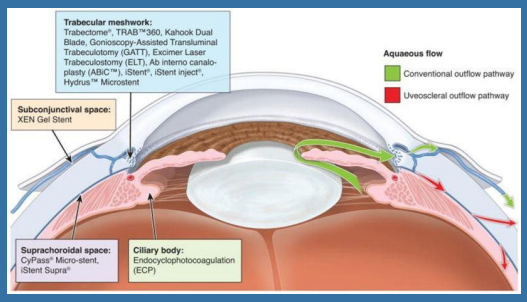
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Minimally/Micro Invasive Glaucoma Surgery (MIGS)

- Group of surgical interventions which share common characteristics
  - High safety profile
  - Minimal disruption of normal anatomy
  - Efficacy (IOP reduction of at least 20%)
- Allow intervention earlier in disease to lower IOP and reduce morbidity of progression
- Reduce the need for more aggressive surgery while still preserving that option
- Reduce medication burden and cost

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MIGS Overview



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Increasing Trabecular Outflow: Goniotomy/Canaloplasty



Trabectome Kahook OMNI

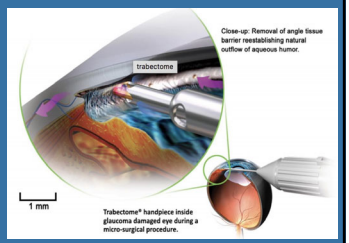


GATT/ABIC Streamline

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Trabectome

- Can be performed stand-alone
- Removes strip of TM and inner wall of Schlemm's canal using disposable irrigation/aspiration/ electrocautery handpiece
- Ablate 60-120 degrees nasally



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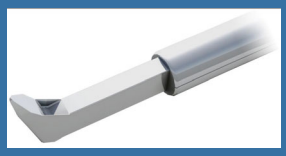
Trabectome



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Kahook Dual Blade

- Can be performed stand-alone
- Creates parallel incisions to unroof Schlemm's canal



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Kahook Dual Blade



https://www.newworldmedical.com/NewWorldMedical/KahookDualBlade

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SION Surgical Instrument

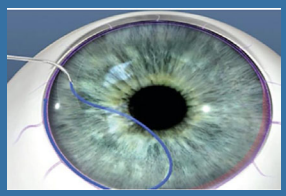
- Can be performed as a stand-alone procedure
- Bladeless design allows a more gentle removal of TM



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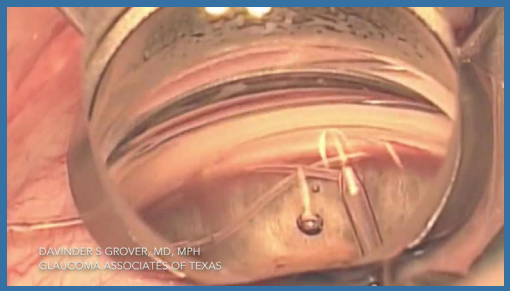
Gonioscopy Assisted Transluminal Trabeculotomy (GATT)

- Can be performed as a stand-alone procedure
- iTrack or suture
- Start with 1-2 clock hour goniotomy followed by guidance of a catheter through Schlem's Canal 360 degrees
- Traction is then applied to the catheter which cleaves the TM 360 degrees



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Gonioscopy Assisted Transluminal Trabeculotomy (GATT)

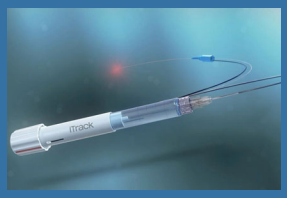


http://glaucomaassociates.com/gonioscopy-assisted-transluminal-trabeculotomy/

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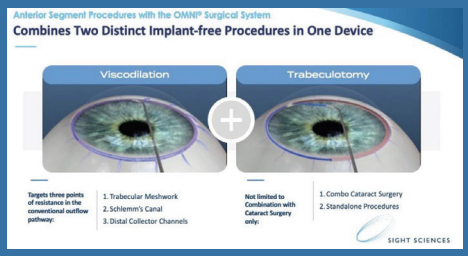
Ab Interno Canaloplasty (AbiC)

- Thread Schlem's Canal with device (iTrack, Visco360) followed by injection of viscoelastic as catheter is retracted
- Can also perform trabeculotomy



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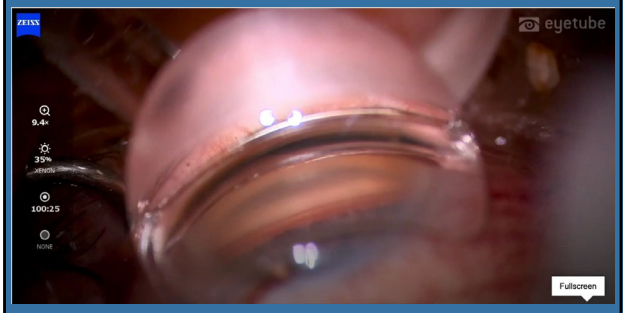
OMNI



Thread Schlemm's Canal with microcatheter and transluminal viscodilation of Schlemm's Canal followed by trabeculotomy

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OMNI



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Streamline



Single use device that delivers small amounts of viscoelastic into Schlemm's Canal

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Streamline

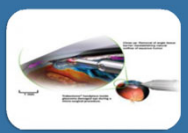


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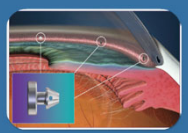
Increasing Trabecular Outflow: Stents



Hydrus



iStent Inject W

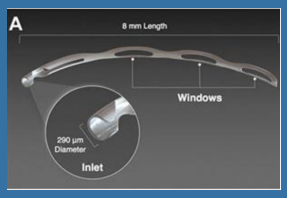


iStent Infinite

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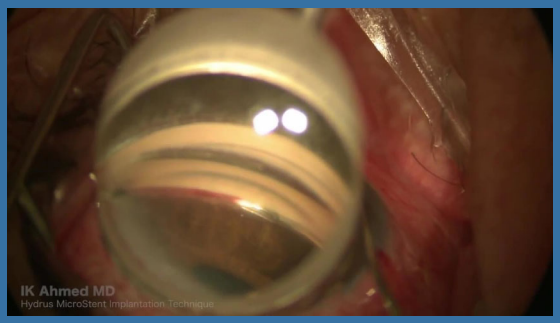
Hydrus Microstent

- Designed to scaffold Schlemm's Canal and access multiple collector channels



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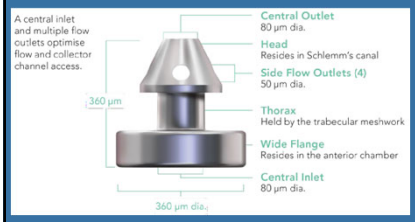
Hydrus Microstent



https://www.youtube.com/watch?v=jqbiSny_mYI

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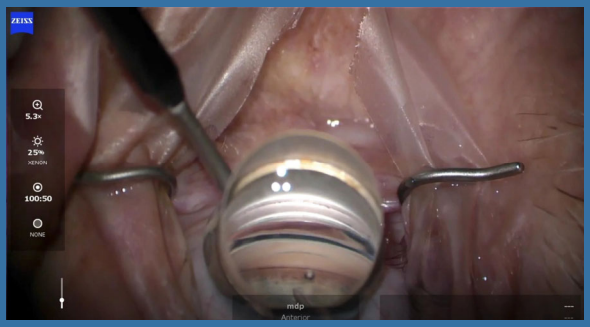
iStent Inject W





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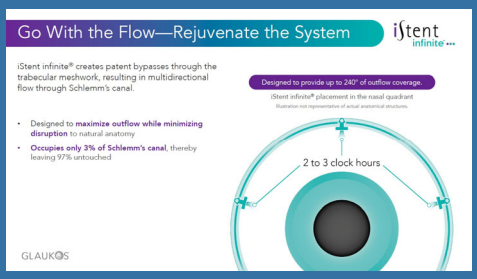
iStent Inject W



https://eyetube.net/videos/implantation-of-istent-inject-w

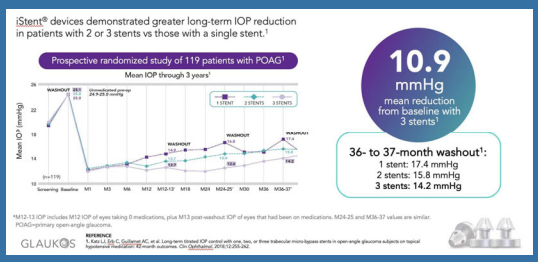
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iStent Infinite



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iStent Infinite



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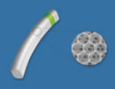
Suprachoroidal



Alloflo Uveo



iStent Supra



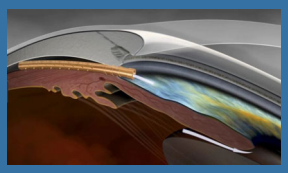
MINIject



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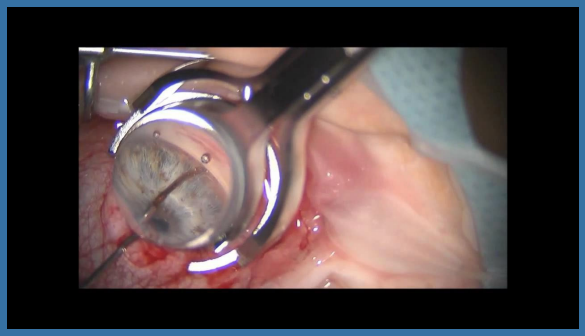
CyPass

- Implanted in potential space between scleral spur and ciliary body band



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CyPass

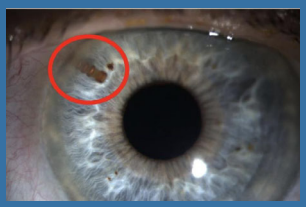


https://www.youtube.com/watch?v=bGn1XoDETmY

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CyPass – Withdrawn from Market 2018

- COMPASS-XT results
  - 5-year follow-up
  - Significant IOP reduction, however…
  - 27.2% of patients with >30% endothelial cell loss vs 10.0% in controls
  - 21.5% of patients with <1500 cells/mm² vs 2.5% in controls
  - Analysis revealed only device position was correlated with endothelial cell loss
- Current guidelines suggest assessing device position
  - If 2 or more rings visible or lumen above Schwalbe's line should be assessed for ECL with specular microscopy
- Occasional transient (6-9 months) myopic shift (~2.5D) due to anterior rotation of ciliary body



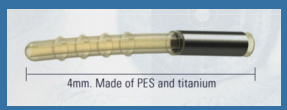
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Alloflo Uveo



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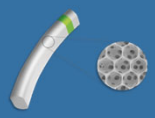
iStent Supra



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MINIject

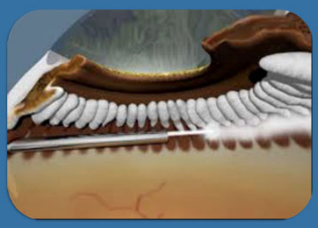
- 2 year data
  - IOP reduced from 23.8->14.4
    - 40% reduction
  - >20% reduction in 89.4%



1.Two-Year Performance and Safety Results of the MINIject Supraciliary Implant in Patients With Primary Open-Angle Glaucoma: Meta-Analysis of the STAR-I, II, III Trials. Dick, H. Burkhard et al. American Journal of Ophthalmology, Volume 260, 172 - 181

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Reducing Aqueous Production

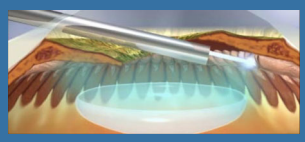


Trans-scleral Cyclophotocoagulation (T-CPC)

Endocyclophotocoagulation (E-CPC)

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Endocyclophotocoagulation



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Endocyclophotocoagulation

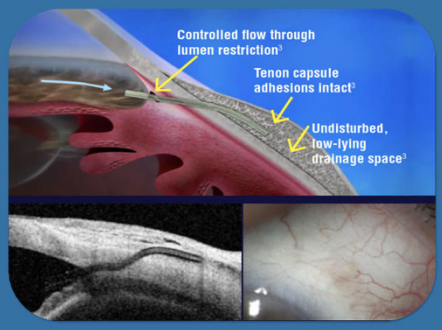


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MIBS
Minimally Invasive Bleb Surgery

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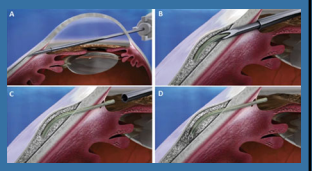
Subconjunctival Filtration



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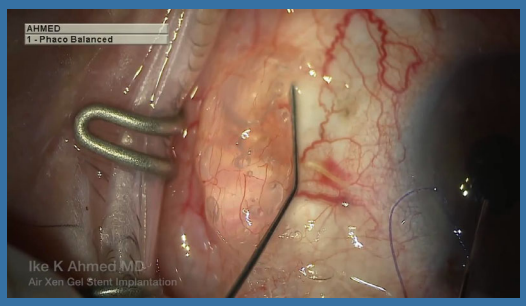
Xen Gel Stent

- Prospective, single-arm study (65 patients with refractory glaucoma)
- IOP reduced by >25% in 80.8% of eyes
- Mean IOP 15.9 (baseline 25.1) at 1 year
- Mean medications 1.7 (baseline 3.5)



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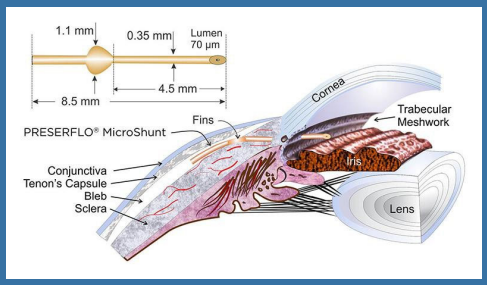
Xen Gel Stent



https://www.youtube.com/watch?v=xYJNeMeOWA

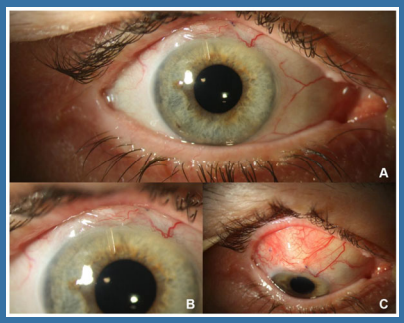
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PreserFlo Microshunt



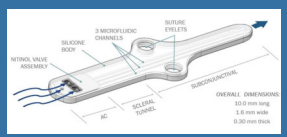
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PreserFlo Microshunt



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Calibreye



- 3 Flow channels that communicate between AC and subconjunctival space
- Valves are present in the AC and can be adjusted by laser
  - 4 different flow states can be set

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Calibreye



https://glaucomatoday.com/articles/2014-may-june/the-calibreye-system

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Comparison

	Mean Pre-op IOP	Mean Post-op IOP (mmHg)	Mean Reduction in IOP (mmHg)	% Reduction in IOP	Mean Reduction in Meds	% of patients with >20% reduction in IOP
Trabectome (1 year data)	20	15.5	4.5	22.5	1.21	
Kahook Dual Blade (1 year data)	17.4	12.5	4.9	28	0.8	
Hydrus Microstent (2 year data)	17.9	10.3	7.6	42	1.4	77.3
GATT (1 year data)	27.9	16.8	11.1	39.8	1.1	
AbiC	17.1	13.1	4.0	23.4	1.0	
iStent Inject (2 year data)	24.1	17.1 (medication-free)	7.0	29		75.8
Cypass (2 year data)	24.5	17.1	7.4	30.2	0.7	72.5
ECP (1 year data)	18.1	16.0	2.1	11.6	1.1	
Xen Gel Stent	25.1	15.9	9.2	36.7	1.8	80.8 (>25%)

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What's Next ??

- Diagnostic ability to localize outflow resistance
- Adjustable therapy
- Greater efficacy with better safety profile

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NORTH GEORGIA EYE ASSOCIATES

What's Now?

- SLT
- Durysta/iDose
- MIGS
  - Combined procedure with cataract removal
  - Stand-alone
- CPC – transscleral and endo
- MIBS

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Thank You

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