RECENT ADVANCES IN THE MEDICAL AND SURGICAL TREATMENT OF GLAUCOMA

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Disclosure

- I developed the course material/information independently
- No relevant financial relationship exists by anyone in control of presentation content

Glaucoma

Chronic Open Angle Glaucoma
- Elevated IOP
- Glaucomatous Optic Neuropathy
- Vision Loss

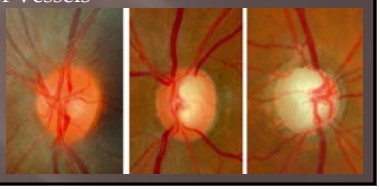
Prevalence by year 2020
World Wide- 76 million
United States- 3.6 million

IOP Measurement

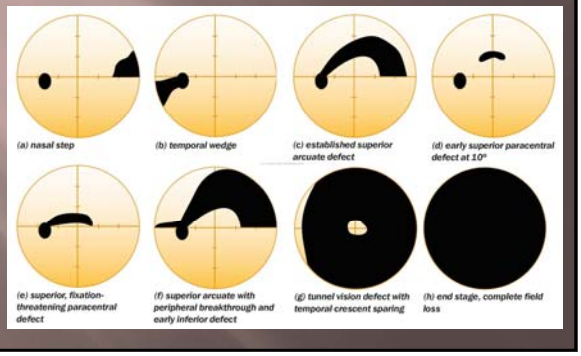
- Applanation Tonometry
  - Corneal Thickness
- iCare
- Tonopen
- Schiotz
- Palpation

Glaucomatous Optic Neuropathy

- Cupping
- Pallor
- Disc Hemorrhage
- Bayoneting
- Nasalization of Vessels

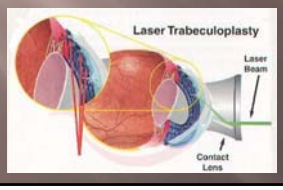


Vision Loss



Glaucoma Treatment Algorithm

- Medication
- Laser
- Incisional Surgery



Medical Therapy

- Prostaglandins
- Beta Blockers
- Alpha Adrenergic Agents
- Carbonic Anhydrase Inhibitors
- Combination Medications
- Miotic Agents

Prostaglandins

- First Line Therapy
- Increase Uveoscleral Outflow
- 30% IOP Reduction
- Convenient
- Few Comorbitities
- Hypertrichosis
- Conjunctival Hyperemia
- Iris/Lid Pigmentation
- Decreased Lid Adipose Tissue
- Xalatan, Lumigan, Travatan Z, Zioptan, Rescula

Beta Blockers

- Decreases Aqueous Production
- 25% IOP Reduction
- Comorbities
  - Bradycardia
  - COPD/Asthma
  - Diabetes
- Dosing Dependent on Iris Color
- "Cheap as Dirt"
- Timoptic, Betoptic, Betimol, Betagan, Istalol…

Alpha Adrenergic Agents

- Dual Mechanism of Action
  - Decreases Aqueous Production
  - Increases Uveoscleral Outflow
- Neuro-Protective Effect
- 20 to 25% IOP Reduction
- Follicular Conjunctivitis
  - Purite
- Crosses Blood Brain Barrier
  - Contraindicated under the age of 2
- Alphagan, Alphagan P, Bromonidine, Propine
- Texas Tech Connection

Carbonic Anhydrase Inhibitors

- Decreases Aqueous Production
- 15 to 20% IOP Reduction
- Stings (Dorzolamide)
- Sulfa Allergy
- Dysgeusia
- Corneal Pathology
- Trusopt, Azopt
- Diamox, Neptazane

Combination Agents

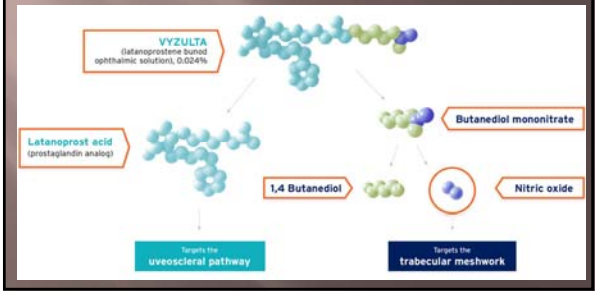
- Cosopt- Timolol/Dorzolamide
  - 33% IOP Reduction
  - Generic, Preservative Free
- Combigan- Timolol/Bromonidine
  - 33% IOP Reduction
- Simbrinza- Brinzolamide/Bromonidine
  - 33% Reduction

Miotic Agents

- Increases Aqueous Outflow Through TM
- 20% Reduction from Baseline
- Significant Comorbities
  - Hyperemia, Conjunctival Fibrosis, Miosis, HA, Myopia, Angle Closure, N/V, Salivation
- Inconvenient
  - QID Dosing
- Pilocarpine, Carbachol, Phospholine Iodide
- Rarely Used

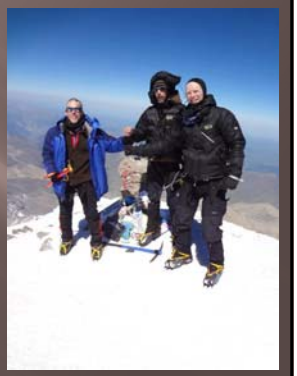
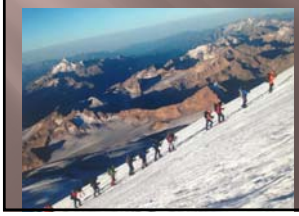
Recent Medical Therapies

- Vyzulta



Future Medical Therapies

- Pharma Very Tight Lipped
- Drug Delivery Systems
  - Punctal Plug
  - Intravitreal Injection
- Combination Medications
  - Alcon, Allergan
- Novel Medication
  - Shire

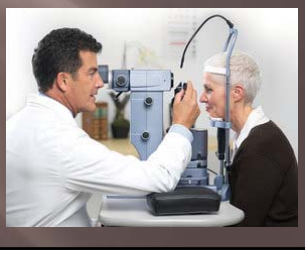
Laser Trabeculoplasty

Argon Laser Trabeculoplasty (ALT)
- 1979- J. B. Wise, MD

Selective Laser Trabeculoplasty (SLT)
- 1999
- Q-switched, frequency doubled Nd:YAG laser
  - Less Thermal Damage to TM- Repeatable

Laser Trabeculoplasy

- Office Procedure
- Topical Anesthesia
- Contact Lens

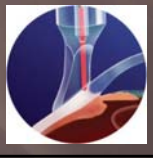


Laser Trabeculoplasty

- IOP Reduction - 20% from Baseline
- 66% Success Rate
- IOP Reduction Persists 2 to 7 years
- Treat 180 Degrees
- Success Related to Pigmentation in TM
- Better Results in PXF & Pigmentary Glaucoma
- SLT can be repeated in previously treated areas but less effective

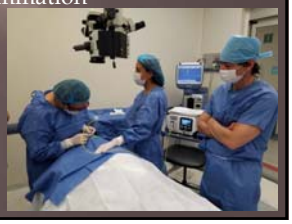
Cyclo G6 Pulse Laser

- Micropulse Diode Laser Applied via Handheld Probe to the Peri-Limbal Area
- Laser Causes Changes in Ciliary Processes thus Decreasing Aqueous Production
- May Also Cause Structural Changes to Scleral Collagen increasing Uveoscleral Outflow



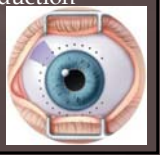
Cyclo G6 Pulse Laser

- Non-incisional
- Must be done in the OR with Local Anesthesia
- 33% IOP Reduction from Baseline
- Minimal Post Op Inflammation
- Repeatable



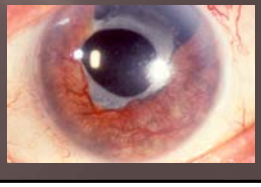
Diode Laser Cyclophotocoagulation

- Same laser as G6 Cyclo
- Higher Laser Power
- Non-invasive
- Outpatient- Local Anesthesia
- Destruction of Cells in Ciliary Processes
- Profound Decrease in Aqueous Production
- Repeatable



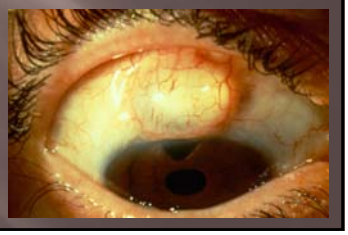
Diode Laser Cyclophotocoagulation

- Post-Op Inflammation
- CME
- Decreased VA
- Most Appropriate for
  - End Stage Glaucoma
  - Neovascular Glaucoma



Incisional Glaucoma Surgery

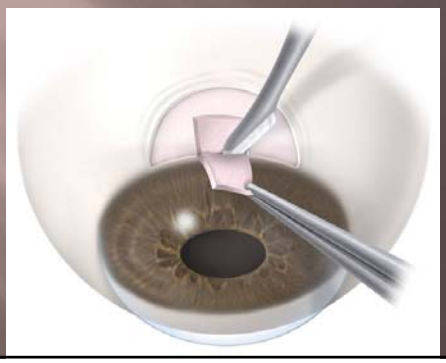
- Traditional Procedures
  - Trabeculectomy
  - Aqueous Shunt Devices
- New Procedures
  - MIGS
    - Stents
    - Canaloplasty
  - Trabectome



Trabeculetomy

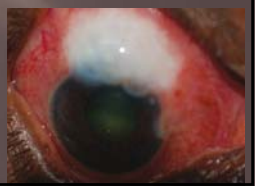
- Gold Standard Incisional Glaucoma Surgery
- Profound Reduction in IOP
- Out-Patient/Local Anesthesia
- Technically Simple Procedure
- Many Potential Complications

Trabeculectomy



Trabeculectomy- Complications

- Hypotony
- Bleb Failure/Fibrosis
  - Mitomicin C
- Bleb Dysesthesia
- Hyphema
- Progression of Cataract
- Bleb Leak
- Blebitis/Endophthalmitis

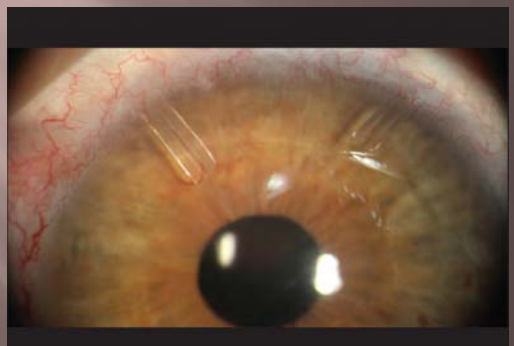


Aqueous Shunt Devices

- Most Invasive Glaucoma Surgery
- Last Resort
  - Exception- Neovascular Glaucoma
- Out-Patient/Local Anesthesia
- Multiple Devices on the Market
  - Ahmed- one way valve
  - Molteno- multiple plates
  - Baerveldt- multiple plates

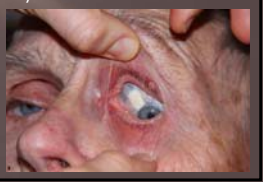
Ahmed Valve

Ahmed Valve



Aqueous Shunt Device-Complications

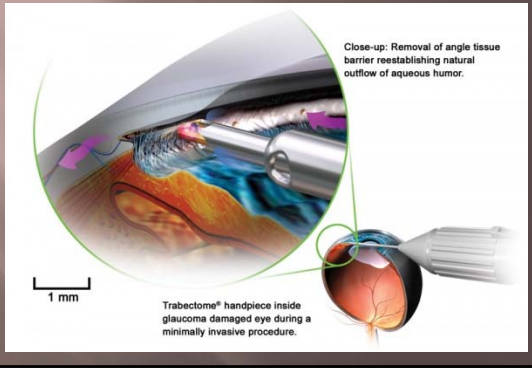
- Hypotony
- Fibrosis Over Plate
- Iris Incarceration into Tube
- Tube Retraction
- Erosion of Tissue over Tube/Plate
- Corneal Decompensation
- Diplopia
- Dyesthesia
- Cosmetic

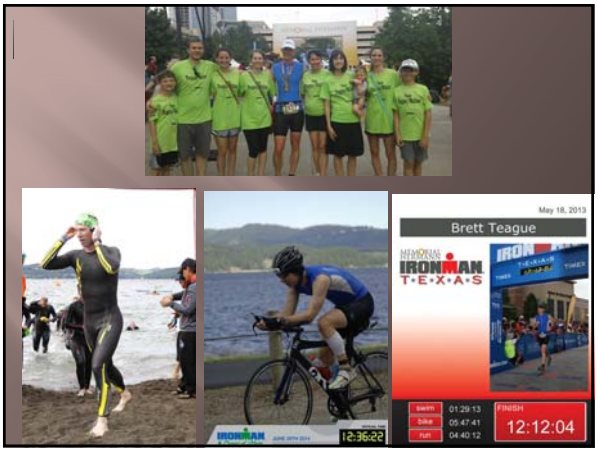


Trabectome

- Ab interno electrode tip used to open Trabecular Meshwork and increase Aqueous Outflow
- 30% Reduction of IOP
- Can be performed Independent of Cataract Sx
- No Controlled Studies
- Start Up Costs Expensive
- Insurance Coverage

Trabectome





MIGS

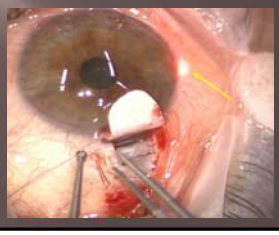
- Minimally Invasive Glaucoma Surgery
- ABiC
- iStent
- CyPass
- Xen Gel Stent

Canaloplasty

- Viscoelastic used to Open Schlemm's Canal
- Promotes outflow of aqueous via the natural outflow pathway / Trabecular Meshwork
- Viscocanalostomy
  - Ab Externo/Cannula
  - Limited Length of SC/TM treated
- Canaloplasty
- ABiC

Canulopasty

- Canuloplasty
  - Ab Externo
  - Catheter Introduced to treat close to 360 Degrees of Schlemm's Canal/Trabecular Meshwork



Canuloplasty

- ABiC
  - AB Interno Canaloplasty
- Microcatheter Introduced 360 Degrees and Viscoelastic Injected as Catheter Withdrawn

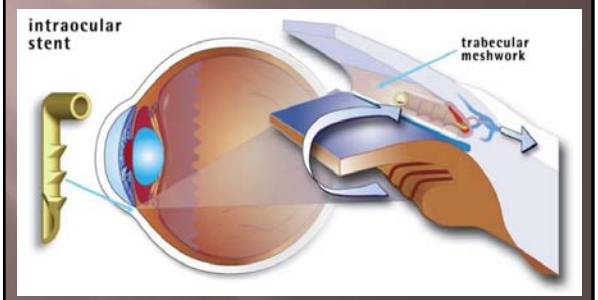
Canaloplasty

- Never Performed Procedure
- Advantages
  - Can be Performed Independent of Cataract Sx
  - Less Invasive
- Disadvantages
  - Learning Curve
  - Start Up Cost
  - Efficacy- ABiC 38% IOP Reduction

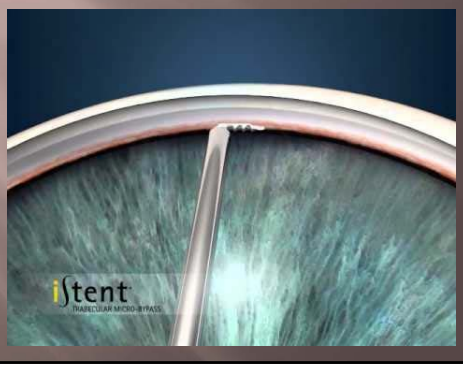
iStent

- Titanium Microstent inserted into the Trabecular Meshwork/Sclemm's Canal
- 36% IOP Reduction
- FDA restricts insertion only in combination with Cataract Surgery

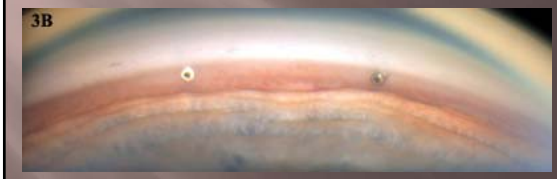
iStent



iStent



iStent

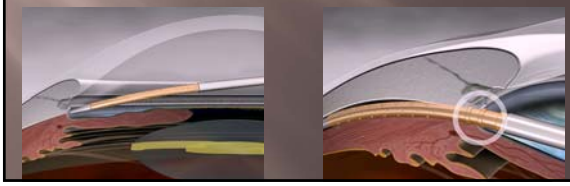


iStent

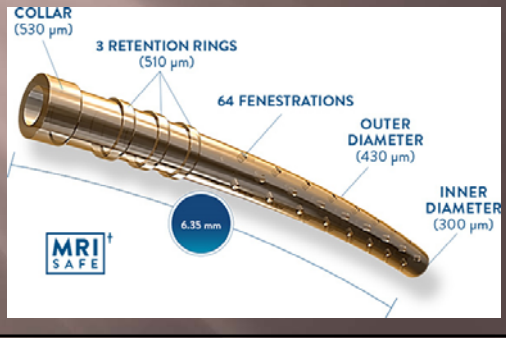
- Advantages
  - Minimally Invasive
- Disadvantages
  - Learning Curve
  - Must be Done with Cataract Surgery
  - Limited to One Stent per Eye
  - ? Efficacy
  - Insurance Coverage

CyPass

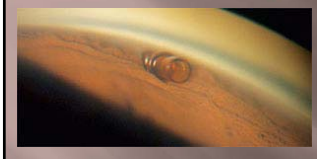
- Titanium Microstent Inserted Through Ciliary Body Face into Supraciliary Space
- **72.5**% treated with the ***CyPass*** achieved a ≥20% reduction in IOP vs 58.0% with cataract surgery alone



CyPass



CyPass

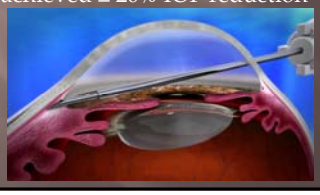


CyPass

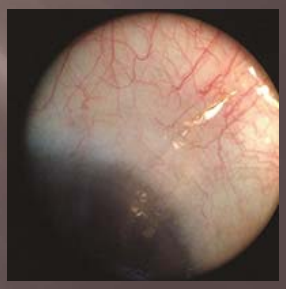
- Advantages
  - Better IOP results as compared to iStent
  - "Easier" compared to iStent
- Disadvantages
  - FDA- approved only w/ Cataract Surgery
  - Learning Curve
  - Hyphema
  - Hypotony
  - Insurance Coverage

Xen Gel Stent

- Recently Approved by FDA
- 6 mm Gel stent inserted ab interno to establish aqueous outflow to the subconjunctival space
- Can be Performed Independent of Cataract Sx
- 76.3% achieved ≥ 20% IOP reduction



Xen Stent



Xen Stent

- First Procedures Scheduled January 30
- Advantages
  - Minimally Invasive
- Disadvantages
  - Learning Curve
  - Insurance Coverage

Case Study- Early OAG

58 yo WM presents for routine eye exam
FHX OAG- mother, maternal GF
VA sc 20/20
IOP 28 OU, CCT 550 microns
C/D- 0.6/0.5
VF- WNL OU
OCT- Borderline NFL thinning OD/WNL OS
Management- ?

Case Study- Moderate OAG

- 67 yo BF referred for large cups/elevated IOP
- RF's- Diabetes, African American
- BCVA- 20/40 OU
- Moderate Nuclear Cataracts OU
- IOP 32 OU, C/D 0.8 OU, CCT- 525 OU
- OCT moderate NFL thinning OU
- VF- Superior Nasal Steps OU
- Management ?

Case Study- LTG

- 42 yo LAF referred for LTG
- FHX- OAG, maternal GM "went blind"
- BCVA 20/30
- IOP 14, CCT 555 OU
- C/D 0.85 OU w/ Pallor
- OCT advanced NFL loss OU
- VF- Paracentral Scotomas OU
- Management ?

Case Study- NVG

- 38 yo WF referred for Neovascular Glaucoma
- Type I Diabetes since age 17-poorly controlled
- BCVA- 20/200 OU
- IOP 62 OU, CCT 610 OU
- Severe Rubesois OU, mild K Edema
- Gonio- NVA OU
- Fundus- PDR, NVD, mild VH
- Management ?