

**Glaucoma Surgery -  
AAO 2009, San Francisco**  
  
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**Disclosure: No Financial Interests  
Pertaining to This Talk**

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## Glaucoma - Definition

- A group of diseases that have in common a characteristic *optic neuropathy* and associated *visual field loss* for which elevated *intraocular pressure (IOP)* is one of the primary risk factors.

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## Classification of Glaucoma

- Open-Angle Glaucomas:
  - Primary Open-Angle Glaucoma
  - Normal-Tension Glaucoma
  - Congenital Glaucoma
  - Juvenile Open-Angle Glaucoma
  - Pigmentary Glaucoma
  - Phacolytic Glaucoma
  - Phacocanaphylactic Glaucoma
  - Inflammatory Glaucoma (open)
  - Ghost Cell Glaucoma
  - Hemolytic Glaucoma
  - Steroid-Induced Glaucoma
  - Angle-Recession Glaucoma
  - Glaucoma Associated w/ Elevated Episcleral Venous Pressure
  - Glaucoma Associated w/ Intraocular Tumors
  - Glaucomatocyclic Crisis
  - Fuchs Heterochromic Iridocyclitis
- Angle-Closure Glaucomas:
  - Acute Angle-Closure Glaucoma
  - Intermittent Angle-Closure Glaucoma
  - Chronic Angle-Closure Glaucoma
  - Plateau Iris Syndrome
  - Phacomorphic Glaucoma
  - Aphakic Angle-Closure Glaucoma
  - Neovascular Glaucoma
  - Inflammatory Glaucoma (closed)
  - Malignant (Ciliary Block) Glaucoma
  - Iridocorneal Endothelial (ICE) Syndrome
  - Epithelial Downgrowth

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## Glaucoma - Epidemiology

- Approximately 3 million Americans suffer from Glaucoma
- Approximately 69 million people worldwide suffer from Glaucoma
- More than 130,000 Americans are legally blind from the disease
- Major Risk Factors:
  - Older Age (60 + yrs.)
  - Black and Hispanic Race
  - Positive Family History

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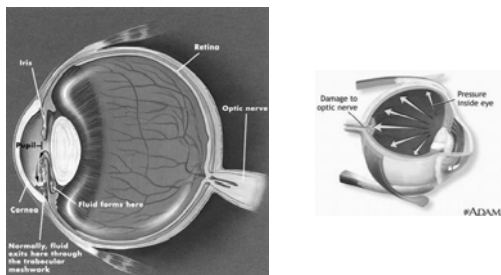
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### Glaucoma – Mechanism of Disease



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### Glaucoma – Mechanism (Trabecular Meshwork Outflow)



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### Glaucoma – Clinical Findings and Means of Monitoring

- Intraocular Pressure (IOP)
  - Mean Population IOP: 16 mm Hg (SD ± 3)
  - Clinical Range of Normal: 8 – 22 mm Hg
- Optic Nerve Appearance
- Visual Field

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### Intraocular Pressure – Applanation Tonometry



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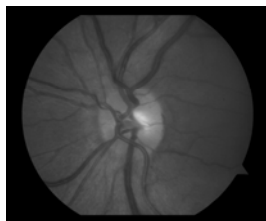
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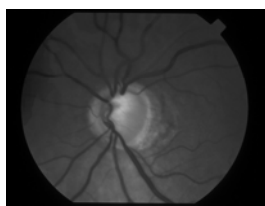
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### Optic Nerve Appearance

Normal



Advanced Glaucoma



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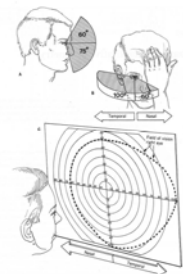
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### Visual Field Assessment



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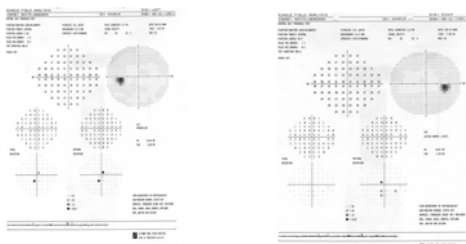
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### Visual Field - Normal



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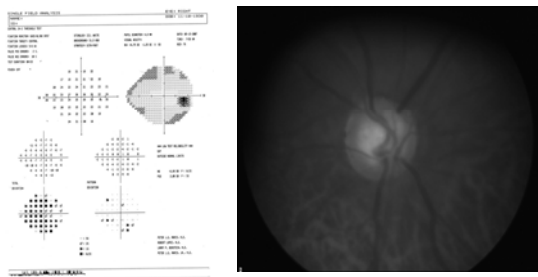
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### Glaucomatous Field Loss - Right



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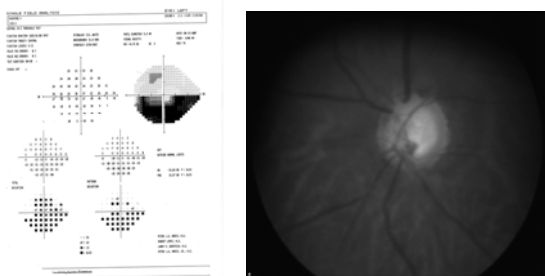
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### Glaucomatous Field Loss - Left



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### Glaucomatous Field Loss – Over Time



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### How Is Glaucoma Treated ?

- Medical Therapy (Drops and Pills)
- Laser Treatment
- Surgical Intervention

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### Glaucoma – Drop Therapy

- Beta Blockers:
  - Timolol (Timoptic, Timoptic XE, Betimol)
  - Betaxolol (Betoptic S)
  - Metipranolol (OptiPranolol)
  - Levobunolol (Betagan)
- Miotics:
  - Pilocarpine
  - Echothiophate iodide (Phospholine Iodide)
- Carbonic Anhydrase Inhibitors:
  - Brinzolamide (Azopt)
  - Dorzolamide (Trusopt)
- Alpha-2 Agonists:
  - Brimonidine (Alphagan)
  - Apraclonidine (Iopidine)
- Prostaglandin Analogues:
  - Latanoprost (Xalatan)
  - Travoprost (Travatan)
  - Bimatoprost (Lumigan)
- Combination Agents:
  - Dorzolamide/Timolol (Cosopt)
  - Brimonidine/Timolol (Combigan)

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## Laser Treatment

- Argon Laser Trabeculoplasty (ALT)
- Selective Laser Trabeculoplasty (SLT)



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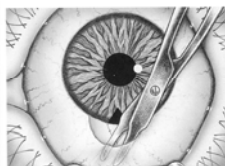
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## When Should Glaucoma Surgery Be Performed ?

- Intraocular Pressure Too High Despite Maximal Medical Therapy
- Progression of Field Loss and/or Optic Neuropathy
- Medical Therapy Not Tolerated (Side Effects)
- Laser Therapy Ineffective ("Burn Out")



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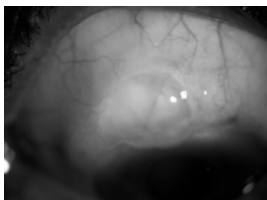
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## Trabeculectomy (Filtration) Surgery

- Most commonly performed glaucoma surgery
- First Described in 1968 (Cairns JD)
- Objective: to direct aqueous outflow through a surgical fistula into subconjunctival space
- Modulation of Wound Healing:
  - Mitomycin C (MMC)
  - 5-Fluorouracil (5-FU)



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### Trabeculectomy – Surgical Sequence



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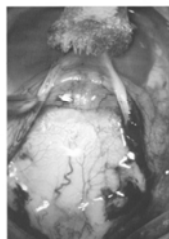
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### Conjunctival Dissection



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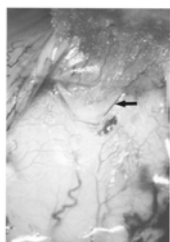
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### Creation of the Scleral Flap



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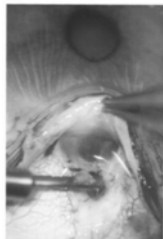
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### Internal Sclerostomy



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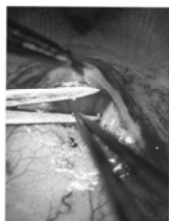
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### Surgical Iridectomy



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### Trabeculectomy – Instrument Layout

- Lieberman Lid Speculum
- .12 Forceps
- Conjunctiva Forceps (Non-Toothed)
- Wescott Tenotomy Scissors (Blunt-Tip)
- Vannas Scissors
- Kelly Descemet's Punch
- Beaver Blade (# 69)
- Castroviejo Caliper
- Barraquer Needle Holder
- Tying Forceps (straight and curved)
- Eraser Cautery

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### Trabeculectomy Layout

- Suture Material:
  - 6-0 Vicryl
  - 10-0 Nylon
  - 9-0 Vicryl (BV needle)
- Antimetabolite:
  - Exposure Time = 1.5 – 5 min.
  - Delivery System = cut-up Weckcel sponges or corneal shield
  - Mitomycin C
    - 0.1 – 0.5 mg/ml
  - 5-Fluorouracil
    - 50 mg/ml



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### Trabeculectomy – Postoperative Care

- Fourth-Generation Fluoroquinolone (Zymar or Vigamox):
  - 4x/day for 2 wks.
- Prednisolone Acetate (EconoPred; PredForte):
  - 8x/day for 2 wks.
  - 6x/day for 2 wks.
  - 4x/day for 2 wks.
  - 3x/day for 2 wks.
  - 2x/day for 2 wks.
  - 1x/day for 2 wks.



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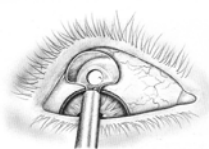
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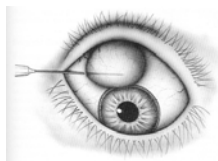
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### Trabeculectomy – Postoperative Care



Laser Suture Lysis



Bleb Needling and Injections

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