Glaucoma Clinical Update

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Objectives

• Understand the different categories of glaucoma
• Recognize the symptoms and signs of open angle and angle-closure glaucoma
• Identify and refer patients at risk for damage caused by glaucoma
• Understand the basic management of open angle and angle-closure glaucoma
• Recognize current testing modalities which assist in early detection
Outline

• Anatomy of anterior chamber and optic nerve
• Categories of glaucoma
• Definition
• Epidemiology
• Risk Factors
• Symptoms
• Signs
• Management
Anatomy
Anterior Chamber Anatomy
Anatomy of the Optic Nerve

- **Vitreous cavity**
  - Large space filled with transparent gel called vitreous humour

- **Retina**
  - Neural tissue lining the vitreous cavity posteriorly
  - Transparent except for blood vessels on its inner surface

- **Macula**
  - Area of retina responsible for fine, central vision
  - Depression in centre of macula is called the fovea

- **Optic Disc**
  - Portion of ON visible within the eye
  - Axons whose cell bodies are located in ganglion cell layer of retina
Glaucoma
Categories
Glaucoma: Categories

1. Open angle  i) Primary  ii) Secondary

2. Closed angle  i) Primary  ii) Secondary
Anterior Chamber Angle
Definitions
Primary Open Angle Glaucoma: Definition

- Primary open-angle glaucoma is a progressive, chronic optic neuropathy in adults in which intraocular pressure (IOP) and other currently unknown factors contribute to damage and in which, in the absence of other identifiable causes, there is a characteristic acquired atrophy of the optic nerve and loss of retinal ganglion cells and their axons. This condition is associated with an anterior chamber angle that is open by gonioscopic appearance.

IN OTHER WORDS....

POAG IS

OPTIC NEUROPATHY RELATED TO ELEVATED IOP CAUSING CHARACTERISTIC OPTIC NERVE APPEARANCE WITH ASSOCIATED VF LOSS WITH OPEN AC ANGLE
Primary Angle Closure
Glaucoma: Definition

- Primary angle closure is appositional or synechial closure of the anterior chamber angle caused by multiple mechanisms, leading to elevated IOP causing a characteristic acquired atrophy of the optic nerve and loss of retinal ganglion cells and their axons.
Epidemiology
Open Angle Glaucoma: Epidemiology

- Primary open-angle glaucoma is a significant public health problem
- Affects 1 in 100 Canadians over age 40
- Prevalence of POAG for adults 40 and older in the United States was estimated to be about 2%
- 45 million people in the world have open-angle glaucoma (OAG)
- 8.4 million people blind from glaucoma
Open Angle Glaucoma: Epidemiology

- Open-angle glaucoma affects an estimated 2.2 million people in the United States, and that number is likely to increase to 3.3 million in 2020 as the population ages.

- Threefold higher prevalence of OAG in African Americans relative to non-Hispanic Whites in the United States.

- Leading cause of blindness in African Americans.

- Prevalence of OAG is even higher in Afro-Caribbeans relative to African Americans.
Angle Closure Glaucoma: Epidemiology

- Highest rates are reported in Inuit, Chinese, and other Asian populations
- Lower rates are reported in populations of African and African-derived origin and European and European-derived origin
- Primary angle-closure glaucoma may account for nearly as many cases of glaucoma as open-angle glaucoma in some Asian populations
- Worldwide, 0.7% of people over 40 are estimated to have angle-closure glaucoma
- It is estimated that 21 million people worldwide will have angle-closure glaucoma in 2020
- In China, PACG is estimated to cause unilateral blindness (visual acuity <3/60 or visual field ≤10°) in 1.5 million individuals and bilateral blindness in another 1.5 million
Open Angle Glaucoma: Natural Course

- Optic disc becomes progressively cupped as axons die off
- Only optic nerve disorder in which severe cupping takes place; in all others, the disc simply becomes pale
- Intraocular pressure is often elevated (higher than 21 mm Hg)
- Visual fields characteristic defects
Angle Closure Glaucoma: Natural Course

- If patients with unilateral AACG and high IOP do not receive treatment, glaucomatous optic neuropathy can occur rapidly.

- Untreated fellow phakic eyes are at increased risk for developing acute angle closure.

- Untreated patients with AACG and PACG develop progressive vision loss that may result in bilateral blindness.
The Risk Factors
Primary Open Angle Glaucoma

**RISK FACTORS**

- Higher IOP
- Older age
- Family history of glaucoma
- Lower ocular perfusion pressure
- Lower systolic and diastolic blood pressure
- Thinner central cornea
- Disc hemorrhage
- Larger cup-to-disc ratio
- Larger mean pattern standard deviation on threshold visual field testing
Primary Angle Closure Glaucoma

DEMOGRAPHIC RISK FACTORS

• Family history of angle closure
• Older age
• Female sex
• Asian or Inuit descent
Primary Angle Closure Glaucoma

OCULAR RISK FACTORS

- Hyperopia
- Shallow peripheral anterior chamber depth
- Shallow central anterior chamber depth
- Steep corneal curvature
- Thick crystalline lens
- Short axial length
Mechanism: Open Angle Glaucoma

Open angle glaucoma
Mechanism: Angle Closure Glaucoma

Angle closure glaucoma
Symptoms
Open Angle Glaucoma Symptoms

- Asymptomatic
  - until late in disease
Open Angle Glaucoma
Angle Closure Glaucoma Symptoms

• Patients may be asymptomatic
• Sudden onset of:
  1. pain
  2. redness
  3. nausea/vomitting
  4. decreased vision
  5. haloes around lights
Angle Closure Glaucoma
Signs
Open Angle Glaucoma Signs

SUBTLE

- Normal cup-disc ratio
- Increased cup-disc ratio
Angle Closure Glaucoma Signs

DRAMATIC

- Cloudy/steam cornea
- Fixed mid-dilated pupil
- Conjunctival injection
- Elevated IOP
Management
Management

- Primary (Acute) Angle Closure Glaucoma = URGENT REFERRAL
- Primary Open Angle Glaucoma = Non-urgent referral
Goals of Management: Open Angle Glaucoma

PRESERVE VISION

- Intraocular pressure controlled in the target range
- Stable optic nerve/retinal nerve fiber layer status
- Stable visual fields
Visual Fields
Optical Coherence Tomography
Management: Open Angle Glaucoma

1. Medications
2. Laser
3. Incisional filtering surgery
Pressure Lowering Agents

• Aqueous suppressants
  1. Beta blockers (Timolol, Betagan)
  2. Alpha agonists (Alphagan)
  3. Carbonic anhydrase inhibitors (Trusopt, Azopt)
Pressure Lowering Agents

- Increased uveoscleral outflow
  1. Prostaglandin analogues
     (Xalatan, Lumigan, Travatan)
  2. Cholinergics (pilocarpine)
Laser Trabeculoplasty
Trabeculectomy
Goals of Management: Acute Angle Closure Glaucoma

• Reverse or prevent angle-closure process

• Control IOP

• Prevent damage to the optic nerve
Management: Acute Angle Closure Glaucoma

1. Medications to lower pressure
2. Laser peripheral iridotomy
References

Eye care America, The Foundation of the American Academy of Ophthalmology (www.eyecareamerica.org)

Canadian Ophthalmological Society website (www.eyesite.ca)


Preferred Practice Patterns, Primary Open Angle Glaucoma. www.aao.org

Preferred Practice Patterns, Primary Angle Closure Glaucoma. www.aao.org
Thank you
Questions