Glaucoma Lecture Notes

Glaucoma is an eye disorder characterized by high intraocular pressure (IOP) and optic nerve damage. It may have a gradual or acute onset.

- There are two major forms of glaucoma:
  - Primary open-angle glaucoma (POAG)—develops without symptoms until vision loss occurs from irreversible increased IOP and nerve damage
  - Angle-closure glaucoma (also known as *narrow angle glaucoma, acute glaucoma,* and *pupillary block*)—can be primary (due to anatomic predisposition) or secondary (due to another process, such as membrane growth over the angle or a mass in the posterior eyeball segment pushing the angle closed); acute angle-closure glaucoma develops quickly and requires immediate treatment

Pathophysiology

POAG

- The angle of the anterior chamber is open but trabecular meshwork is partially blocked.
- IOP usually increases, possibly due to increased production of aqueous humor or decreased outflow, leading to cupping and atrophy of the optic disk and loss of optic nerve fibers with eventual atrophy of the optic nerve.

Angle-Closure Glaucoma

- The outflow of aqueous humor through the trabecular meshwork is blocked because of a complete or partial closure of the angle of the anterior chamber.
- Pressure builds up behind the iris, causing the peripheral iris to bow forward and cover all or part of the anterior chamber angle.
- Blockage leads to increased IOP and damage to the trabecular network and optic nerve.
- Aqueous egress through the pupil is limited.

Causes

POAG

- Exact cause is unknown; possibly hereditary
- One theory identifies possible accumulation of mucopolysaccharides in the trabecular meshwork as the underlying mechanism

Angle-Closure Glaucoma

- Predisposing ocular anatomy or a secondary process

Risk Factors

- Elevated IOP
- History of another eye condition or trauma
- Hypertension
- Age older than 40
- Family history
- Long-term corticosteroid use
- Asian or Inuit heredity

POAG

- Increased IOP
- Positive family history
- Myopia
- Diabetes
- Cardiovascular disease, hypertension
- Prolonged use of topical, periocular, inhaled, or systemic corticosteroids
- Central corneal thickness
- Age older than 40 years

Angle-Closure Glaucoma

- Small cornea
- Hyperopia
- Advanced age
- Medications, such as anticholinergics, antihistamines, and antidepressants
- Asian ethnicity
- Family history
- Female sex
- Stressful situation

Incidence

- Glaucoma is the second leading cause of blindness worldwide.
- POAG is the most common form of glaucoma and the leading cause of blindness attributed to glaucoma.
- More females develop angle-closure glaucoma.
- POAG affects approximately 1% of Americans; it occurs primarily in people older than age 40.

Complications

- Varying degrees of vision loss
- Total blindness

Assessment

History

POAG

- Typically asymptomatic
- Possible lack of awareness of vision changes

Angle-Closure Glaucoma

- With acute angle-closure glaucoma, rapid onset symptoms likely
- Possibly mild or no symptoms (gradual changes in peripheral vision with chronic form)
- Periocular pain
- Blurred vision
- Redness in eye
- Lacrimation
- Frontal headache
- Nausea and vomiting
- Halos around lights

Physical Findings

POAG

- Fluctuating or increased IOP
- Cup-to-disk ratio greater than 0.5
- Paracentral scotomas
- Visual field deficits; central field loss occurring late in the disease

Angle-Closure Glaucoma

- Elevated IOP
- Lid edema
- Conjunctival hyperemia
- Fixed mid-dilated pupil
- Corneal edema
- Reduced central visual acuity
- Halos around lights and blurry vision

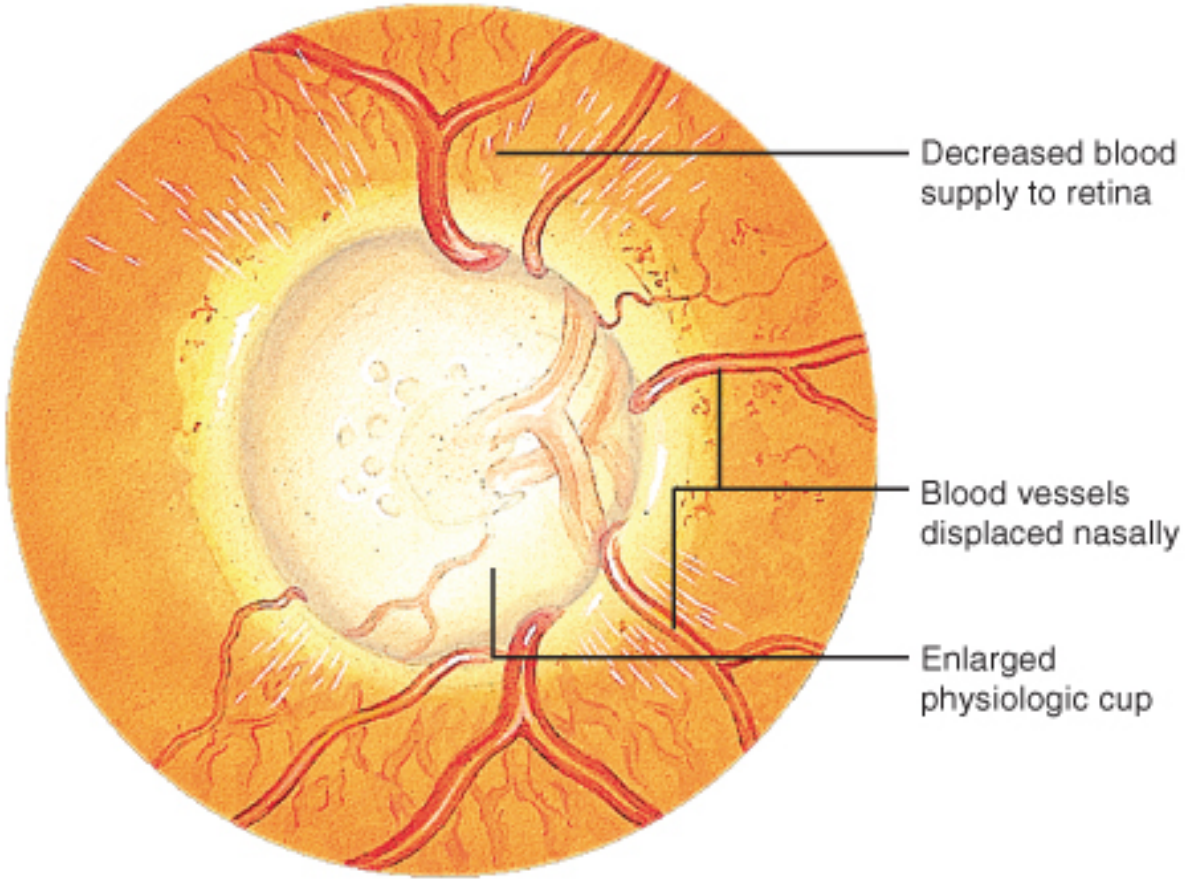
Diagnostic Test Results

Diagnostic Procedures

- Tonometry measurement shows increased IOP.

- Slit-lamp examination shows effects of glaucoma on the anterior eye structures.
- Gonioscopy shows the angle of the eye's anterior chamber (the gold standard for diagnosing angle-closure glaucoma).
- Ophthalmoscopy aids visualization of the fundus.
- Perimetry or visual field tests show the extent of peripheral vision loss.
- Fundus photography shows optic disk changes.
- Pachymetry is done to measure corneal thickness.

Optic disk changes
Cupping of the optic disk is characteristic of primary open-angle glaucoma.



Treatment

WARNING!
Acute angle-closure glaucoma is considered an emergency because of its rapid onset. If left untreated, it can lead to blindness in less

than 1 week.

General

- Reduction of IOP
- Venous thromboembolism prophylaxis while the resident is hospitalized or on complete bed rest

Activity

- Bed rest (with acute angle-closure glaucoma)

Medications

- IV fluids

POAG

- Ocular hypotensive agents to decrease aqueous production, such as beta-adrenergic antagonists (timolol maleate, levobunolol hydrochloride, carteolol hydrochloride, betaxolol hydrochloride); parasympathomimetics (miotics), such as pilocarpine hydrochloride (ophthalmic); carbonic anhydrase inhibitors, such as oral acetaZOLAMIDE, topical brinzolamide–brimonidine tartrate; adrenergic agonists, such as brimonidine tartrate, to suppress aqueous inflow
- Prostaglandin analogues, such as latanoprost, bimatoprost, or travoprost, to increase aqueous outflow
- Hyperosmotic agents, such as IV mannitol or oral glycerin

Angle-Closure Glaucoma

- Systemic carbonic anhydrase inhibitors, such as IV acetaZOLAMIDE
- Ophthalmic carbonic anhydrase inhibitors such as brinzolamide–brimonidine tartrate, dorzolamide hydrochloride
- Topical beta-adrenergic blockers, such as timolol maleate and betaxolol hydrochloride
- Ophthalmic prostaglandins such as travoprost, latanoprost, or bimatoprost
- Topical miotics such as pilocarpine hydrochloride (ophthalmic)
- Oral hyperosmotic agents such as mannitol

WARNING!
Occasionally, systemic absorption of a beta-adrenergic blocker from eyedrops is enough to cause bradycardia, hypotension, heart block, bronchospasm, impotence, or depression.

Surgery

- Immediate laser or surgical iridectomy (for acute angle-closure glaucoma)
- Argon laser trabeculoplasty
- Trabeculectomy
- Shunt surgery

Nursing Considerations for Long-Term Care

LTC Tips

Older adult residents in long-term care commonly have altered drug distribution and drug metabolism due to higher body fat, decreased muscle mass, possible hepatic disease, and decreased drug excretion; these conditions can be caused by compromised kidney function. Additionally, older adult residents are at greater risk of adverse drug interactions due to polypharmacy.

Nursing Interventions

- Assess the resident's and family's awareness and understanding of the condition.
- Assess the resident's anxiety and comfort level.
- Encourage the resident to express feelings and level of comfort.
- Teach the resident and family about the disease, the treatment regimen and options, signs and symptoms to report (such as pain, anxiety, and visual changes), and the importance of adhering to the treatment regimen.
- Teach the resident and family about ophthalmic medications, dosages, route, times of administration, correct administration technique, and possible adverse reactions.
- Teach the resident strategies to cope with any changes in visual acuity.
- Teach the resident strategies to become actively involved in the treatment regimen, and encourage involvement in self-care activities according to ability level.
- Administer ophthalmic medications, as ordered; monitor and report any adverse medication reactions to the resident's practitioner.
- Monitor the resident's environment for potential safety hazards and initiate interventions to prevent falls and injuries (such as keeping pathways clear, providing adequate lighting, keeping frequently used items within easy reach, and preventing clutter).
- Avoid room changes and/or rearranging of the room whenever possible.
- Facilitate eye examinations, as needed.
- Provide and encourage the resident's participation in activities and interests.
- Refer the resident and family to counseling and social services, as needed.
- Ensure that adaptive equipment is available for activities of daily living and leisure activities requiring visual acuity.
- Ensure the appropriateness of visual appliances.

Monitoring

- Vital signs
- Comfort and anxiety level
- Resident's ability to perform self-care and activities safely
- Visual changes (eye pain, rainbows or halo effects around lights, blurred or cloudy vision)
- Frequency, duration, and severity of visual symptoms
- Resident's knowledge of the disease process
- Resident's knowledge of and adherence to the treatment regimen
- Resident's motivation and willingness to participate in the treatment regimen, self-care, and activities
- Social isolation

Associated Long-Term Care Nursing Procedures

- Ambulation, progressive, long-term care
- Assessment differences in an older adult, long-term care
- Care of the resident with visual impairment, long-term care
- Care plan preparation, long-term care
- Change in status, identifying and communicating, long-term care
- Difficult behavior management, long-term care
- Documentation, long-term care
- Eye care
- Eyedrop administration
- Eye ointment application
- Fall management, long-term care
- Fall prevention, long-term care
- Health history interview and physical assessment, long-term care
- Oral drug administration
- Pain assessment, long-term care
- Pain management

Resident Teaching

General

Include the resident's family or caregiver in your teaching, when appropriate. Provide information according to their individual communication and learning needs. Be sure to cover:

- disorder, diagnostic testing, and treatment, including the need for immediate treatment of acute angle-closure glaucoma
- need for meticulous adherence to the prescribed drug therapy
- all procedures and treatments, especially surgery
- technique for proper eyedrop administration
- that most residents recover lost vision with adequate treatment for acute angle-closure glaucoma
- that lost vision associated with POAG can't be restored but that treatment can minimize

further loss
- importance of adhering to therapy, including use of eyedrops and schedule of use
- modification of the resident's environment for safety and how vision will be altered postoperatively or while the eye is patched
- signs and symptoms that require immediate medical attention, such as sudden vision changes, eye pain, and headache
- importance of glaucoma screening for early detection and prevention
- need for lifelong monitoring for POAG
- importance of follow-up evaluations for vision testing, IOP measurement, and visual field testing, as appropriate.

Discharge Planning

- Participate as part of a multidisciplinary team to coordinate discharge planning efforts. The team may include a bedside nurse, social worker, case manager, primary care practitioner, and eye surgeon.
- Assess the resident's and family's understanding of the diagnosis, treatment, prognosis, follow-up, and warning signs for which to seek medical attention.
- Assess the resident's level of independence before admission.
- Evaluate how the resident's current illness will impact independence.
- Determine the appropriate posthospital setting to which the resident will be discharged.
- Identify the resident's formal and informal supports.
- Identify the resident's and family's goals, preferences, comprehension, and concerns about discharge.
- Confirm arrangements for initial follow-up visits.
- Provide a list of prescribed drugs, including the dosage, prescribed time schedule, and adverse reactions to report to the practitioner. Provide the resident (and family or caregiver, as needed) with written information on the medications that the resident should take after discharge.
- Assess the resident's and family's understanding of prescribed medication, including dosage, administration, expected results, duration, and possible adverse effects.
- Assess the resident's ability to obtain medications; identify the party responsible for obtaining medications.
- Instruct the resident to provide a list of medications to the practitioner who will be caring for the resident after discharge; to update the information when the practitioner discontinues medications, changes doses, or adds new medications (including over-the-counter products); and to carry a medication list that contains all of this information at all times in the event of an emergency.
- Assess the resident's mobility and balance, and educate the resident and family about fall prevention.
- Ensure arrangements for home health care services, if needed.
- Ensure that the resident and caregivers receive medical contact information.
- Ensure that the resident (and family or caregiver, as needed) receives a copy of the discharge instructions and that a copy is placed in the resident's medical record.
- Document the discharge planning evaluation in the resident's clinical record, including who was involved in discharge planning and teaching, their understanding of the teaching provided, and any need for follow-up teaching.