

## **CATARACT**

### **1. DEFINITION:**

A cataract is a clouding of the lens in the eye that affects vision. Most cataracts are related to aging. Cataracts are very common in older people. By age 80, more than half of all Americans either have a cataract or have had cataract surgery.



A cataract can occur in either or both eyes. It cannot spread from one eye to the other.

### **2. CLASSIFICATION:**

The following is a classification of the various types of cataracts. This is not comprehensive and other unusual types may be noted.

- **Classified by etiology**
- **Age-related cataract**
- Cortical Senile Cataract
  - Immature senile cataract (IMSC): partially opaque lens, disc view hazy
  - Mature senile cataract (MSC): Completely opaque lens, no disc view
  - Hypermature senile cataract (HMSC): Liquefied cortical matter: **Morgagnian cataract**
- Senile Nuclear Cataract
  - Cataracta brunescens

- cataracta nigra
- cataracta rubra
- Congenital cataract
  - Sutural cataract
  - Lamellar cataract
  - Zonular cataract
  - Total cataract
  - Secondary cataract
- **Drug-induced cataract (e.g. corticosteroids)**
- **Traumatic cataract**
  - Blunt trauma (capsule usually intact)
  - Penetrating trauma (capsular rupture & leakage of lens material—calls for an emergency surgery for extraction of lens and leaked material to minimize further damage)
- **Classified by location of opacity within lens structure**
  - Anterior cortical cataract
  - Anterior polar cataract
  - Anterior subcapsular cataract
- **Nuclear cataract—Grading correlates with hardness & difficulty of surgical removal**
  - 1: Grey
  - 2: Yellow
  - 3: Amber
  - 4: Brown/Black (Note: "black cataract" translated in some languages (like Hindi) refers to glaucoma, not the color of the lens nucleus)
- **Posterior cortical cataract**

- Posterior polar cataract (importance lies in higher risk of complication—posterior capsular tears during surgery)
- Posterior subcapsular cataract (PSC) (clinically common)
- After-cataract: posterior capsular opacification (PCO) subsequent to a successful extracapsular cataract surgery (usually within three months to two years) with or without IOL implantation.

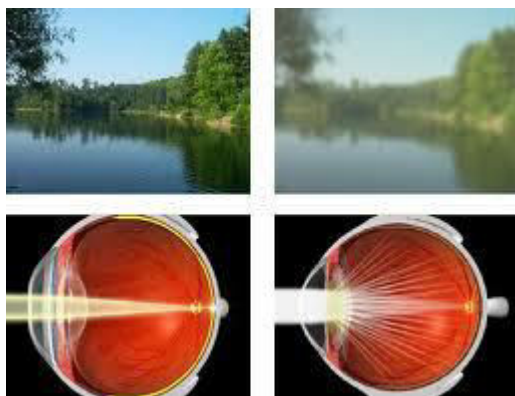
### 3. ETIOLOGY:

- Senile **cataract**—commonly occurs with aging.
- Congenital **cataract**—occurs at birth.
- Traumatic **cataract**—occurs after injury.
- Aphakia—absence of crystalline lens.
- Additional risk factors for **cataract** formation include diabetes; ultraviolet light exposure; high-dose radiation; and drugs, such as corticosteroids, phenothiazines, and some chemotherapy agents.

#### 4. pathophysiology:

The lens is made mostly of water and protein. Specific proteins within the lens are responsible for maintaining its clarity. Over many years, the structures of these lens proteins are altered, ultimately leading to a gradual clouding of the lens. Rarely, cataracts can present at birth or in early childhood as a result of hereditary enzyme defects, and severe trauma to the eye, eye surgery, or intraocular inflammation can also cause cataracts to occur earlier in life.

### 5. CLINICAL MANIFESTATIONS



- Blurred or distorted vision.
- Glare from bright lights.
- Gradual and painless loss of vision.
- Previously dark pupil may appear milky or white.
- Colors that seem faded
- Not being able to see well at night
- Double vision

## **6. DIAGNOSTIC EVALUATION**

- Slit-lamp examination—to provide magnification and visualize opacity of lens
- Tonometry—to determine IOP and rule out other conditions
- Direct and indirect ophthalmoscopy to rule out retinal disease
- Perimetry—to determine the scope of the visual field (normal with cataract)

## **7. MANAGEMENT**

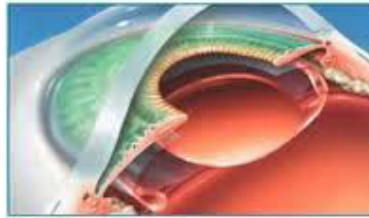
### **7.1. GENERAL**

- Surgical removal of the lens is indicated.
  - When a cataract interferes with activities, the patient may request cataract surgery.
  - Because cataract often occurs in both eyes, surgery is recommended when vision in the better eye causes problems in daily activities. Surgery is done on only one eye at a time.
- Cataract surgery is usually done under either regional block or topical anesthesia, with or without I.V. sedation. Oral medications may be given to reduce IOP.
- IOL implants are usually implanted at the time of cataract extraction, replacing thick glasses that may provide suboptimal refraction.
- In the rare instance that intraocular lens implant is not used, the patient will be fitted with appropriate eyeglasses or a contact lens to correct refraction after the healing process.
- Since 1986, Medicare has stipulated that all cataract surgery be done on an outpatient basis.

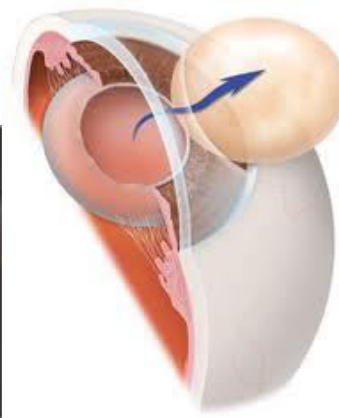
### **7.2. SURGICAL PROCEDURES**

Two types of extractions:

- Intracapsular extraction—the lens as well as the capsule are removed through a small incision. (This technique is rarely used in the United States.)



- Extracapsular extraction—the lens capsule is incised, and the nucleus, cortex, and anterior capsule are extracted.



- The posterior capsule is left in place and is usually the base to which an IOL is implanted.
- A conservative procedure of choice, simple to perform, is usually done under local anesthesia.

Two types of procedures for extraction are:

- Cryosurgery—a special technique in which a pencil-like instrument with a metal tip is supercooled ( $-35^{\circ}\text{C}$ ), then touched to the exposed lens, freezing to it so the lens is easily lifted out. (This technique is rarely used in the United States.)

- Phacoemulsification—the mechanical breaking up (emulsifying) of the lens by a hollow needle vibrating at ultrasonic speed. This action is coupled with irrigation and aspiration of the emulsified particles from the anterior chamber.

### Intraocular Lens Implantation

- The implantation of a synthetic lens (IOL) is designed for distance vision; the patient may wear prescription glasses for reading and near vision. Intraocular lens implant restores binocular vision.
- Previously, most IOLs were spherical with the front surface curved. Aspheric IOLs increase the contrast sensitivity.
  - In 2004, the FDA approved an aspheric IOL. The lens can reduce postoperative spherical aberrations and, therefore, improve the ability to see in varying light conditions, such as rain, snow, fog, twilight, and night-time darkness.
  - In 2005, the FDA approved the first toric IOL, which is designed to correct astigmatism.
  - Sophisticated calculations are required to determine the prescription for the lens.
  - Numerous types of IOLs are available. Designs and materials change as new developments occur.
- Advantages of the IOL include the following:
  - Provides an alternative for the person who cannot wear contact lenses.
  - Cannot be lost or misplaced like conventional glasses.
  - Provides superior vision correction and better depth perception than glasses.
- Complications (specific to implantation):
  - Pain from inflammation of various eye structures—usually controlled by nonsteroidal anti-inflammatories, but systemic antibiotics and immunosuppression may be required.
  - Rosy vision (glare) due to keeping pupil from full constriction; excessive light enters pupil, causing a dazzling of macula (minute corneal opacity).
  - Degeneration of the cornea.
  - Malpositioning or dislocation of lens.
- Implants may not be advisable for patients with severe myopia, history of chronic iritis, retinal detachment, diabetic retinopathy, glaucoma, and complications during surgery.

### Contact Lens

Extended-wear contact lens is an option for those who do not receive IOL implants. They restore binocular vision and result in magnification of images in the range of 7% to 10%.

The patient will need to take the lens out for cleaning periodically, or, if the patient is elderly or debilitated, will need to follow up at intervals for cleaning at the ophthalmologist's office.

Complications

- Blindness

### **7.3. NURSING MANAGEMENT:**

#### **Nursing Assessment**

##### **Preoperative**

- Assess knowledge level regarding procedure.
- Assess level of fear and anxiety.
- Determine visual limitations.

##### **Postoperative**

- Assess pain level.
  - Sudden onset—may be due to ruptured vessel or suture and may lead to hemorrhage.
  - Severe pain—accompanied by nausea and vomiting; may be caused by increased IOP and may require immediate treatment.
- Assess visual acuity in unoperated eye.
- Assess for signs of infection—fever, inflammation, pain, drainage.
- Assess the patient's level of independence.

##### **Nursing Diagnoses**

- Deficient Knowledge of operative course
- Risk for Injury related to surgical complications

##### **Nursing Interventions**

##### **Preparing the Patient for Surgery**

- Orient the patient and explain procedures and care plan to decrease anxiety.
- Instruct the patient not to touch eyes to decrease contamination.
- Obtain conjunctival cultures, if requested, using aseptic technique.
- Administer preoperative eyedrops—antibiotic, mydriatic-cycloplegic, and other medications—mannitol solution I.V., sedative, antiemetic, and opioid as directed.

### **Preventing Complications Postoperatively**

- Medicate for pain, as prescribed, to promote comfort.
- Administer medication to prevent nausea and vomiting as needed.
- Notify the health care provider of sudden pain associated with restlessness and increased pulse, which may indicate increased IOP, or fever, which may indicate infection.
- Caution the patient against coughing or sneezing to prevent increased IOP.
- Advise the patient against rapid movement or bending from the waist to minimize IOP. The patient may be more comfortable with head elevated 30 degrees and lying on the unaffected side.
- Allow the patient to ambulate as soon as possible and to resume independent activities.
- Assist the patient in maneuvering through environment with the use of one eye while eye patch is on (1 to 2 days).
- Encourage the patient to wear eye shield at night to protect operated eye from injury while sleeping.

## **8. PATIENT EDUCATION AND HEALTH MAINTENANCE**

### Promoting Independence

- Advise the patient to increase activities, as tolerated, unless given restrictions by the surgeon.
- Caution against activities that cause patient to strain (eg, lifting heavy objects, straining at defecation, and strenuous activity) for up to 6 weeks as directed.
- Instruct the patient and family about proper eyedrop or ointment instillation.
- Advise the patient to bring all medications to follow-up visits to permit dosage adjustments by ophthalmologist. Discontinued medications can then be discarded to prevent confusion.

### Adjusting to Visual Change



- Inform the patient receiving corrective lenses that fitting for temporary corrective lenses for the first 6 weeks will occur several days after surgery.
- Prescription for permanent lenses will be determined 6 to 12 weeks after surgery.
- Prescription for a permanent contact lens will be determined about 3 to 6 weeks after surgery.
- Encourage the patient to wear dark glasses after eye dressings are removed to provide comfort from photophobia due to lack of pupil constriction from mydriatic cycloplegic drops.

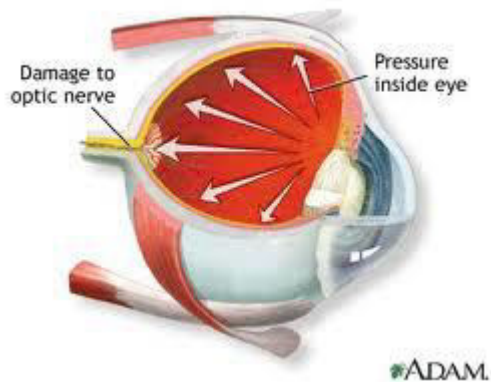
#### Adjusting to the Eyeglasses

- Stress the importance of patience in the coming weeks of adjustment—it is easy to become frustrated.
- Tell the patient that if glasses are to be worn, they will cause the perceived image to be about one-third larger than normal. Glasses cannot restore binocular vision as an intraocular lens implant or contact lens will because of the discrepancy of image size between the treated eye and untreated eye.
- If glass is used in the prescription, it is heavier and thicker than the more expensive plastic cataract eyeglass lenses.
- Instruct the patient to look through the center of corrective glasses and to turn head when looking to the side because peripheral vision is markedly distorted.
- It is necessary to relearn space judgment—walking, using stairs, reaching for articles on the table (such as a cup of coffee), and pouring liquids—due to loss of binocular vision and peripheral distortion.
- Advise patients to use handrails while walking and doing steps, and to reach out slowly for objects to be picked up.

## ACUTE (ANGLE-CLOSURE) GLAUCOMA

### 1. DEFINITION:

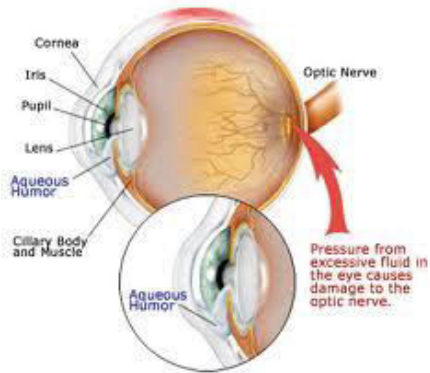
A condition in which an obstruction occurs at the access to the trabecular meshwork and the canal of Schlemm. IOP is normal when the anterior chamber angle is open, and glaucoma occurs when a significant portion of that angle is closed. Glaucoma is associated with progressive visual field loss and eventual blindness if allowed to progress. This is most commonly an acute painful condition not to be confused with chronic open-angle glaucoma.



### 2. ETIOLOGY:

- Mechanical blockage of anterior chamber angle results in accumulation of aqueous humor (fluid).
- Anterior chamber is anatomically shallow in most cases.
- The shallow chamber with narrow anterior angles is more prone to physiologic events that result in closure.
- Angle closure occurs because of pupillary dilation or forward displacement of the iris.
- Angle closure can occur in subacute, acute, or chronic forms.
- Episodes of subacute closure may precede an acute attack and cause transient blurred vision and pain but no increased IOP.
- Acute angle closure causes a dramatic response with sudden elevation of IOP and permanent eye damage within several hours if not treated.
- Within several days, scar tissue forms between the iris and cornea, closing the angle. The iris and ciliary body begin to atrophy, the cornea degenerates because of edema, and the optic nerve begins to atrophy.

### 2. PATHOPHYSIOLOGY:



Initiating events: illness, emotional stress, congenital narrow angles, long term use of corticosteroids,

and mydriatics

Structural alterations in the aqueous outflow system: tissue and cellular changes takes place

Functional alterations: increased IOP and decreased blood flow

Optic nerve damage: atrophy of the optic nerve by loss of nerve fibres and blood supply

Visual loss: progressive loss of vision is characterized by visual field defects

#### 4. CLINICAL MANIFESTATIONS:



- Pain in and around eyes due to increased ocular pressure; may be transitory attacks.
- Rainbow of color (halos) around lights.
- Vision becomes cloudy and blurred.

- Pupil mid-dilated and fixed.
- Nausea and vomiting may occur.
- Hazy-appearing cornea due to corneal edema.
- Although onset may have initial subclinical symptoms, severity of symptoms may progress to cause acute symptoms of increased IOP—nausea and vomiting, sudden onset of blurred vision, severe pain, profuse lacrimation, and ciliary injection.

## **5. DIAGNOSTIC EVALUATION:**

- Tonometry—elevated IOP, usually greater than 50 mm Hg.
- Ocular examination may reveal a pale optic disk.
- Gonioscopy (using special instrument called gonioscope) to study the angle of the anterior chamber of the eye.

## **6. MANAGEMENT:**

### **6.1. Pharmacologic**

- Emergency pharmacotherapy is initiated to decrease eye pressure before surgery.
- Medications are prescribed at the discretion of the ophthalmologist according to the patient's condition and needs.
- Medication classifications prescribed include:
  - Parasympathomimetic drugs used as miotic drugs—pupil contracts; iris is drawn away from cornea; aqueous humor may drain through lymph spaces (meshwork) into canal of Schlemm.
  - Carbonic anhydrase inhibitor—restricts action of enzyme that is necessary to produce aqueous humor.
  - Beta-adrenergic blockers—nonselective—may reduce production of aqueous humor or may facilitate outflow of aqueous humor.
  - Hyperosmotic agents—to reduce IOP by promoting diuresis.

### **6.2. Surgical management:**

- Surgery is indicated if:

- IOP is not maintained within normal limits by medical regimen.
- There is progressive visual field loss with optic nerve damage.
- Types of surgery include:
  - Peripheral iridectomy—excision of a small portion of the iris whereby aqueous humor can bypass pupil; treatment of choice. Typically a laser procedure.
  - Trabeculectomy—partial-thickness scleral resection with small part of trabecular meshwork removed and iridectomy. Necessary if peripheral anterior adhesions (synechiae) have developed due to repeated glaucoma attacks.
  - Laser iridotomy—multiple tiny laser incisions to iris to create openings for aqueous flow; may be repeated.
- Other eye is usually operated on eventually as a preventive measure.

### **6.3. NURSING MANAGEMENT:**

#### **Nursing Assessment**

- Evaluate the patient for severe pain, nausea and vomiting, signs of increased IOP.
- Assess visual symptoms.
- Establish history of onset of attack and previous attacks.
- Assess the patient's level of anxiety and knowledge base.

#### **Nursing Diagnoses**

- Acute Pain related to increased IOP
- Fear related to pain and potential loss of vision

#### **Nursing Interventions**

##### **Relieving Pain**

- Notify the health care provider immediately of the patient's condition.
- Administer opioids and other medications as directed. Medications that may cause nausea and vomiting are avoided. The patient may be medicated with antiemetic if nausea occurs.
- Explain to the patient that the goal of treatment is to reduce IOP as quickly as possible.
- Explain procedures to the patient.

- Reassure the patient that, with reduction in IOP, pain and other signs and symptoms should subside.
- Explain adverse effects of medications:
  - Mannitol (Osmitrol) (I.V.)—transient blurred vision, rhinitis, thirst, nausea, transient circulatory overload, and headache
  - Acetazolamide (Diamox) or methazolamide (Neptazane) (oral)—drowsiness, anorexia, paresthesia, stomach upset, tinnitus, fluid and electrolyte imbalance, rare kidney or liver dysfunction
  - Pilocarpine (Pilocar, Isopto carpine) (topical)—burning and redness of eye, headache, constricted pupil, poor vision in dim light, retinal detachment, rare lens opacity

### **Relieving Fear**

- Provide reassurance and calm presence to reduce anxiety and fear.
- Prepare the patient for surgery, if necessary.
- Describe procedure to the patient; surgery will likely be done on outpatient basis.
- Patch will be worn for several hours, and sunglasses may help with photophobia.
- Vision will be blurred for first few days after the procedure.
- Frequent initial follow-up will be necessary for tonometry to make sure control of IOP.

### **7. COMPLICATIONS**

Uncontrolled IOP that can lead to optic atrophy and total blindness.

### **8. PATIENT EDUCATION AND HEALTH MAINTENANCE**

- Instruct the patient in use of medications. Stress the importance of long-term medication use to control this chronic disease. Patients commonly forget that eyedrops are medications and that glaucoma is a chronic illness.
- Remind the patient to keep follow-up appointments.
- Instruct the patient to seek immediate medical attention if signs and symptoms of increased IOP return—severe eye pain, photophobia, and excessive lacrimation.
- Advise the patient to notify all health care providers of condition and medications and to avoid use of medications that may increase IOP, such as corticosteroids and anticholinergics (such as antihistamines), unless the benefit outweighs the risk.

## **CHRONIC (OPEN-ANGLE) GLAUCOMA**

### **1. DEFINITION:**

Glaucoma is characterized as a disorder of increased IOP, degeneration of the optic nerve, and visual field loss. Open-angle glaucoma makes up 90% of primary glaucoma cases (angle-closure glaucoma makes up the other 10%), and its incidence increases with age. Incidence with chronic open-angle glaucoma—2% at age 40, 7% at age 70, 8% at age 80.

### **2. ETIOLOGY:**

Degenerative changes occur in the trabecular meshwork and canal of Schlemm, causing microscopic obstruction. Aqueous fluid cannot be emptied from the anterior chamber, increasing IOP.

IOP varies with activity, and some people tolerate elevated IOP without optic damage (ocular hypertension), whereas others exhibit visual field defects and optic damage with minimal or transient IOP elevation. The risk of eye damage increases with age, family history of glaucoma, diabetes, and hypertension.

### **3. CLINICAL MANIFESTATIONS:**

- Mild, bilateral discomfort (tired feeling in eyes, foggy vision).
- Slowly developing impairment of peripheral vision—central vision unimpaired.
- Progressive loss of visual field.
- Halos may be present around lights with increased ocular pressure.

### **4. DIAGNOSTIC EVALUATION:**

- Tonometry—IOP usually greater than 24 mm Hg but may be within normal limits
- Ocular examination—to check for clipping and atrophy of the optic disk
- Visual fields testing for deficits

### **5. MANAGEMENT:**

- Commonly treated with a combination of topical miotic agents (increase the outflow of aqueous humor by enlarging the area around trabecular meshwork) and oral carbonic anhydrase inhibitors and beta-adrenergic blockers (decrease aqueous production).

- Remission may occur; however, there is no cure. The patient should continue to see health care provider at 3-to 6-month intervals for control of IOP.
- If medical treatment is not successful, surgery may be required, but is delayed as long as possible.
- **Types of surgery include:**
  - Laser trabeculoplasty
    - An outpatient procedure, treatment of choice if increased ocular pressure unresponsive to medical regimen only.
    - As many as 100 superficial surface burns are placed evenly at junction of pigmented and nonpigmented trabeculum meshwork for 360 degrees in anesthetized eye, which allows increased outflow of aqueous humor.
    - Maximum decrease in IOP is achieved in 2 to 3 months, but IOP may rise again in 1 to 2 years.
  - Iridencleisis—an opening is created between anterior chamber and space beneath the conjunctiva; this bypasses the blocked meshwork, and aqueous humor is absorbed into conjunctival tissues.
  - Cyclodiathermy or cyclocryotherapy—the ciliary body's function of secreting aqueous humor is decreased by damaging the body with high-frequency electrical current or supercooled probe applied to the surface of the eye over the ciliary body.
  - Corneoscleral trephine (rarely done)—a permanent opening at the junction of the cornea and sclera is made through the anterior chamber so aqueous humor can drain.

## **6. NURSING MANAGEMENT:**

### **Nursing Assessment**

- Assess frequency, duration, and severity of visual symptoms.
- Assess the patient's knowledge of disease process and anxiety about the diagnosis.
- Assess the patient's motivation to participate in longterm treatment.

### **Nursing Diagnoses**

- Deficient Knowledge about glaucoma and surgical procedure

### **Nursing Interventions**

#### **Providing Information About Glaucoma**



- Review the normal anatomy and physiology of the eye as well as the changes that occur in the drainage of aqueous humor with glaucoma.
- Make sure that the patient understands that, although asymptomatic, IOP could still be elevated, and damage to the eye could be occurring. Therefore, ongoing use of medication and follow-up are essential.
- Teach the patient the action, dosage, and adverse effects of all medications. Make sure of adequate administration of eyedrops by watching the patient give return demonstration.
  - Timolol (Timoptic) and betaxolol (Betoptic)—adverse effects include headache, eye irritation, decreased corneal sensitivity, blurred vision, bradycardia, palpitations, bronchospasm, hypotension, and heart failure
  - Pilocarpine (Pilocar, Isopto Carpine)—adverse effects include eye irritation, blurring, and redness; headache; pupil constriction; poor vision in dim light; possible hypertension and tachycardia; and rare retinal detachment and lens opacity
  - Acetazolamide (Diamox) and methazolamide (Neptazane)—adverse effects include drowsiness, anorexia, paresthesia, stomach upset, tinnitus, fluid and electrolyte imbalance, and rare kidney and liver dysfunction
- Discuss visual defects with the patient and ways to compensate. Vision loss is permanent, and treatment is aimed at stopping the process.
- Inform the patient that surgery is done on outpatient basis and recovery is quick. Prolonged restrictions are not required.
  - After surgery, elevation of head 30 degrees will promote aqueous humor drainage after a trabeculectomy.
  - Additional medications after surgery include topical steroids and cycloplegics to decrease inflammation and to dilate the pupil.

## **7. PATIENT EDUCATION AND HEALTH MAINTENANCE:**

- Patient must remember that glaucoma cannot be cured, but it can be controlled.
- Remind the patient that periodic eye checkups are essential because pressure changes may occur.
- Alert the patient to avoid, if possible, circumstances that may increase IOP:
  - Upper respiratory infections
  - Emotional upsets—worry, fear, anger

- Exertion, such as snow shoveling, pushing, heavy lifting
- Recommend the following:
  - Continuous daily use of eye medications as prescribed
  - Moderate use of the eyes
  - Exercise in moderation to maintain general well-being
  - Unrestricted fluid intake: alcohol and coffee may be permitted unless they are noted to cause increased IOP in the particular patient
  - Maintenance of regular bowel habits to decrease straining
  - Wearing a medical identification tag indicating the patient has glaucoma

## 8. BIBLIOGRAPHY:

1. Lewis, (2008), *Medical Surgical Nursing Assessment and Management of Clinical Problems*, 7<sup>th</sup> edition, mosby publications: USA, pp: 355-395.
2. Brunner & suddarth, (2004), *Textbook Of Medical Surgical Nursing*, 10<sup>th</sup> edition, lippincott Williams and wilkins publication:Philadelphia, pp: 440-457.
3. Cassmeyer, l., p., (1993), *Medical Surgical Nursing*, 3<sup>rd</sup> edition, mosby publications: USA, pp: 427-438.
4. Black, m, j., (1999), *Medical Surgical Nursing*, 5<sup>th</sup> edition, w.b. saunders publications:USA, PP:445-456.
5. Lippincott manual, (2001), manual of nursing practice, 7<sup>th</sup> edition, lippincott Williams and wilkins publication:Philadelphia, pp:116-135.