

Ophthalmology and Optometry Guide

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Basic Guides

1. Anatomy of the Eye

- **Cornea:** Transparent front layer of the eye; focuses light.
- **Iris:** Colored part; controls the size of the pupil.
- **Pupil:** Central opening in the iris; regulates light entry.
- **Lens:** Focuses light onto the retina.
- **Retina:** Light-sensitive tissue; converts light to electrical signals.
- **Macula:** Central part of the retina; provides detailed vision.
- **Optic Nerve:** Transmits signals from the retina to the brain.
- **Vitreous Humor:** Gel-like substance in the eye.

2. Eye Examination Checklist

1. Patient History:

- Chief complaint (e.g., blurry vision, pain).
- History of present illness.

- Medical history (e.g., diabetes, hypertension).
- Family history of eye conditions.
- Current medications.

2. Visual Acuity Testing:

- Snellen chart for distance vision.
- Near card for near vision.

3. Refraction:

- Retinoscopy or autorefractor.
- Manual refraction with trial lenses.

4. External Examination:

- Eyelids, conjunctiva, sclera.
- Pupillary reflexes (direct and consensual).

5. Slit-Lamp Biomicroscopy:

- Cornea, anterior chamber, lens.
- Check for cataracts, corneal edema.

6. Intraocular Pressure (IOP):

- Measured using Goldmann tonometry or non-contact tonometry.

7. Posterior Segment Examination:

- Fundoscopy using an ophthalmoscope.
- Check the optic disc, macula, and blood vessels.

3. Patient Education Tips

• Understanding Vision Changes:

- Normal aging changes include presbyopia and slower dark adaptation.
- Educate patients on differentiating between normal changes and pathological symptoms.

• Contact Lens Care:

- Wash hands before handling lenses.
- Avoid overnight wear (unless extended wear lenses are prescribed).

- Use appropriate lens cleaning solutions.
- **Sun Protection:**
 - Wear sunglasses blocking UVA/UVB rays.
 - Emphasize protection in patients with macular degeneration or cataracts.
- **Nutrition and Eye Health:**
 - Encourage foods rich in lutein, zeaxanthin, omega-3s (e.g., leafy greens, fish).
 - Importance of vitamins A, C, and E for retinal health.
- **Managing Post-Surgical Patients:**
 - Emphasize adherence to post-op medication schedules.
 - Explain signs of complications (e.g., pain, sudden vision loss).
 - Schedule timely follow-ups to assess healing.
 - Encourage protective eyewear post-surgery.
 - Educate on maintaining hygiene to prevent infections.
- **Recognizing Ocular Red Flags:**
 - Sudden vision changes.
 - Persistent eye pain or redness.
 - Flashes, floaters, or shadowing in vision.
 - Pupil irregularities.
 - Unexplained photophobia or glare sensitivity.
- **Age-Specific Recommendations:**
 - **Children:** Vision screenings at school age.
 - **Young Adults:** Protective eyewear for sports.
 - **Middle Age:** Presbyopia management.
 - **Seniors:** Regular glaucoma and macular degeneration checks.
- **Promoting Digital Eye Health:**
 - Follow the 20-20-20 rule (20-second break every 20 minutes, look 20 feet away).
 - Ensure proper screen brightness and contrast.
 - Recommend blue light filters or glasses.
 - Educate on proper ergonomics for computer use.
 - Encourage breaks and blinking exercises.

- **Preventing Workplace Injuries:**
 - Use safety goggles in hazardous environments.
 - Educate on risks of UV exposure and welding arcs.
 - Implement proper lighting and ergonomics.
 - Train on first aid for ocular injuries.
 - Encourage regular vision checks for those in high-risk jobs.

Procedures

1. Common Diagnostic Procedures

- **Fundus Photography:**
 - Captures images of the retina.
 - Used for diabetic retinopathy, macular degeneration.
- **Optical Coherence Tomography (OCT):**
 - Cross-sectional imaging of retina and macula.
 - Detects macular edema, glaucoma.
- **Visual Field Testing:**
 - Evaluates peripheral vision.
 - Essential for glaucoma diagnosis.
- **Fluorescein Angiography:**
 - Highlights retinal blood vessels using dye.
 - Detects leakage or blockages.
- **Pachymetry:**
 - Measures corneal thickness.
 - Used in refractive surgery and glaucoma.

2. Therapeutic Procedures

- **YAG Laser Capsulotomy:**

- Treats posterior capsule opacification after cataract surgery.
- **Intravitreal Injections:**
 - Anti-VEGF drugs for macular degeneration or diabetic macular edema.
 - Injections include anti-VEGF agents like bevacizumab, ranibizumab.
 - Requires sterile technique to minimize infection risks.
 - Conducted in-office under topical anesthesia.
 - Regular monitoring needed post-injection.
- **LASIK (Laser-Assisted In Situ Keratomileusis):**
 - Corrects refractive errors (myopia, hyperopia, astigmatism).
- **Trabeculectomy:**
 - Surgical procedure to lower intraocular pressure in glaucoma.
 - Creates a drainage channel for glaucoma management.
 - Reduces intraocular pressure (IOP).
 - Requires mitomycin-C application to prevent scarring.
 - Regular follow-ups to monitor for bleb complications.
 - Alternatives include minimally invasive glaucoma surgeries (MIGS).

3. Specialized Imaging Techniques

- **Ultrasound Biomicroscopy (UBM):**
 - Provides high-resolution imaging of the anterior segment.
 - Used for angle-closure glaucoma or anterior segment tumors.
- **Indocyanine Green Angiography (ICGA):**
 - Visualizes choroidal blood flow.
 - Used for diagnosing polypoidal choroidal vasculopathy (PCV).
- **Corneal Topography:**
 - Maps the corneal surface curvature.
 - Essential for keratoconus diagnosis and pre-refractive surgery planning.

4. Visual Rehabilitation Procedures

- **Low Vision Aids:**

- Magnifiers, telescopic lenses, screen readers for macular degeneration patients.
- **Prosthetic Eyes:**
 - Used after enucleation for severe trauma or tumors.

5. Blepharoplasty

- Surgical correction of droopy eyelids.
- Improves both vision and aesthetic appearance.
- Performed under local anesthesia.
- Minimal recovery time, with sutures removed in 5-7 days.
- Common complications: bruising, swelling, asymmetry.

6. Dacryocystorhinostomy (DCR)

- Procedure to treat nasolacrimal duct obstruction.
- Creates a bypass for tear drainage.
- Can be done externally or endoscopically.
- High success rate with few complications.
- Post-op care includes antibiotic eye drops.

7. Scleral Buckling

- Surgical repair for retinal detachment.
- Silicone band applied around the eye to support the retina.
- May involve drainage of subretinal fluid.
- Performed under local or general anesthesia.
- Post-op positioning critical for healing.

Terminologies

- **Amblyopia:** Reduced vision in one eye due to abnormal visual development (lazy eye).
- **Asthenopia:** Eye strain, often due to overuse or uncorrected refractive errors.
- **Astigmatism:** Irregular corneal shape causing distorted vision.
- **Blepharitis:** Inflammation of the eyelids.
- **Chalazion:** Chronic granulomatous inflammation of a blocked meibomian gland.

- **Diplopia:** Double vision due to misalignment or neurological issues.
- **Drusen:** Yellow deposits in the retina, associated with macular degeneration.
- **Ectropion:** Outward turning of the eyelid.
- **Entropion:** Inward turning of the eyelid, often causing lashes to rub on the cornea.
- **Epiphora:** Excessive tearing due to obstruction or irritation.
- **Fundus:** Interior surface of the eye, includes retina, macula, and optic disc.
- **Heterochromia:** Difference in iris coloration, congenital or due to disease.
- **Hyperopia:** Farsightedness; difficulty focusing on nearby objects.
- **Hypopyon:** Accumulation of white blood cells in the anterior chamber.
- **Mydriasis:** Prolonged pupil dilation, often drug-induced or from trauma.
- **Myopia:** Nearsightedness; difficulty focusing on distant objects.
- **Photophobia:** Sensitivity to light.
- **Phthisis Bulbi:** Shrinkage and atrophy of a non-functional eye.
- **Presbyopia:** Age-related loss of near focusing ability.
- **Pseudophakia:** Presence of an intraocular lens post-cataract surgery.
- **Ptosis:** Drooping of the upper eyelid due to muscle weakness.
- **Scotoma:** Area of partial or complete vision loss (blind spot).
- **Synechiae:** Adhesion between the iris and cornea or lens.
- **Trichiasis:** Eyelashes growing inward, causing corneal irritation.
- **Vitreous Syneresis:** Liquefaction of the vitreous gel, a normal aging process.

Common Diagnoses

1. Refractive Errors

- **Myopia (Nearsightedness):**

- Symptoms: Blurry distance vision, squinting.
- Treatment: Glasses, contact lenses, LASIK.
- **Hyperopia (Farsightedness):**
 - Symptoms: Blurry near vision, eye strain.
 - Treatment: Convex lenses, LASIK.
- **Astigmatism:**
 - Symptoms: Distorted or blurred vision at all distances.
 - Treatment: Glasses, toric lenses, LASIK.

2. Cataracts

- Symptoms:
 - Blurry vision, glare, difficulty with night vision.
- Diagnosis:
 - Slit-lamp examination.
- Treatment:
 - Surgical removal and lens implantation.

3. Glaucoma

- Symptoms:
 - Loss of peripheral vision, halos around lights.
- Diagnosis:
 - High IOP, optic nerve damage, visual field loss.
- Treatment:
 - Medications (e.g., prostaglandin analogs).
 - Surgery (e.g., trabeculectomy).

4. Diabetic Retinopathy

- Symptoms:
 - Floaters, blurry vision, vision loss.
- Diagnosis:
 - Fundus photography, fluorescein angiography.
- Treatment:
 - Laser therapy, intravitreal anti-VEGF injections.

5. Age-Related Macular Degeneration (AMD)

- Symptoms:
 - Central vision loss, difficulty reading.
- Diagnosis:
 - Fundoscopy, OCT, fluorescein angiography.
- Treatment:
 - Anti-VEGF injections for wet AMD.

6. Dry Eye Syndrome

- Symptoms:
 - Grittiness, burning sensation, fluctuating vision.
- Diagnosis:
 - Schirmer test, tear breakup time (TBUT).
- Treatment:
 - Artificial tears, punctal plugs, cyclosporine drops.

7. Uveitis

- Symptoms:
 - Eye pain, redness, photophobia, blurry vision.
- Classification:
 - **Anterior uveitis:** Iris and ciliary body inflammation.
 - **Intermediate uveitis:** Vitreous inflammation.
 - **Posterior uveitis:** Retina and choroid inflammation.
- Diagnosis:
 - Slit-lamp exam, fundoscopy, and laboratory workup for systemic diseases.
- Treatment:
 - Corticosteroids (topical, systemic).
 - Immunosuppressants for chronic cases.

8. Retinal Detachment

- Symptoms:
 - Sudden appearance of floaters, flashes, shadow over vision.
- Diagnosis:
 - Fundoscopy, OCT, B-scan ultrasound.
- Treatment:
 - Surgical repair (scleral buckle, vitrectomy).

Diagnostic Tools and Technologies

1. Tear Film Evaluation

- **Meibography:**
 - Imaging of the meibomian glands to diagnose dry eye syndrome.
- **Tear Osmolarity Testing:**
 - Measures tear composition for diagnosing evaporative or aqueous-deficient dry eye.

2. Electrodiagnostic Tests

- **Electroretinogram (ERG):**
 - Assesses retinal function.
 - Diagnoses inherited retinal diseases (e.g., retinitis pigmentosa).
- **Visual Evoked Potential (VEP):**
 - Evaluates optic nerve function.
 - Used in optic neuritis or amblyopia.

Advanced Procedures

1. Keratoplasty

- **Penetrating Keratoplasty (PK):**
 - Full-thickness corneal transplant for keratoconus or scarring.
- **Endothelial Keratoplasty (DMEK, DSEK):**
 - Replaces only the damaged endothelial layer.

2. Refractive Lens Exchange (RLE)

- **Indications:**
 - High hyperopia or myopia not correctable with LASIK.
- **Procedure:**
 - Removal of the natural lens, replacement with an intraocular lens (IOL).

Ocular Emergencies

1. Acute Angle-Closure Glaucoma

- Symptoms:
 - Severe pain, nausea, vomiting, blurry vision, halos.
- Management:
 - Immediate IOP-lowering medications (e.g., acetazolamide, mannitol).
 - Laser peripheral iridotomy.

2. Chemical Injury

- First Aid:
 - Copious irrigation with saline or water.
 - Immediate referral to ophthalmologist.
- Long-term Management:
 - Treat corneal epithelial defects, reduce inflammation.

3. Central Retinal Artery Occlusion (CRAO)

- Symptoms:
 - Sudden, painless loss of vision.
- Management:
 - Ocular massage, anterior chamber paracentesis, systemic evaluation for embolism.

Systemic Diseases and Ocular Manifestations

1. Diabetes Mellitus

- Ocular Manifestations:
 - Diabetic retinopathy, cataracts, glaucoma.
- Screening:
 - Annual dilated fundus exams.

2. Hypertension

- Ocular Manifestations:
 - Hypertensive retinopathy (flame hemorrhages, cotton wool spots).
- Management:
 - Systemic blood pressure control.

3. Thyroid Eye Disease

- Symptoms:
 - Proptosis, lid retraction, diplopia.
- Management:
 - Systemic corticosteroids, orbital decompression surgery.

Pediatric Ophthalmology

1. Strabismus

- Esotropia:
 - Inward deviation of the eye.
 - Treated with glasses, prism, or surgery.
- Exotropia:
 - Outward deviation of the eye.
 - Managed with exercises, glasses, or surgery.

2. Congenital Cataracts

- Diagnosis:
 - Red reflex testing.
- Treatment:
 - Early surgical intervention to prevent amblyopia.

3. Retinopathy of Prematurity (ROP)

- Screening:
 - Preterm infants (<32 weeks or <1500g birth weight).
- Treatment:
 - Laser therapy or anti-VEGF injections.

4. Amblyopia

- Reduced vision in one eye due to disuse.
- Treatment:
 - Occlusion therapy (patching).

5. Congenital Glaucoma

- Symptoms:
 - tearing, photophobia, corneal enlargement.
- Treatment:
 - Surgical intervention is primary treatment.

6. Retinoblastoma

- Cancer of the retina in children.
- Presents with leukocoria (white pupil reflex).

7. Juvenile Idiopathic Arthritis (JIA)

- Associated with uveitis.
- Requires regular screening.

8. Congenital Nasolacrimal Duct Obstruction

- Symptoms: tearing, recurrent