Disorders of the Special Senses

- Introduction
  - Without senses you would not know anything about the world around you
  - Sensory perceptions are:
    - Seeing
    - Hearing
    - Tasting
    - Smelling
    - Touching

- From these five senses you receive impressions of:
  - Warmth
  - Softness
  - Pressure
  - Pain
  - Sense of equilibrium
    - Are you moving?
    - What is your body's posture/position

- By detecting environmental changes, the sensory system provides humans with protection and determines our responses.

- Examples:
  - Noise hear an ambulance
  - Smell smoke
  - Cold weather
  - Taste injest spoiled food E.g.

- From your studies you know that:
  - Receptors receive a stimuli
  - Nerve routes carry the stimulus to the brain
  - Centers in the brain interpret the stimulus

- I. Normal A&P of the Eye
  - A. Eye – opthalmo
    - Is the organ of vision
    - Lie in a ball shaped cavity in the skull called the orbit
    - Between the eye and its bony surroundings is a protective cushion of fat

- 1. Eyelids – retractable cover of the eye's anterior
  - Medical prefix for eyelid is blephar(o)
- 2. Conjunctiva – also covers the anterior eye beneath and lining the eyelids
  - It is a transparent mucous membrane supplied with blood vessels and nerve endings

- Lacrimal glands – which produce tears, keep the eye moist
  - Located at the outer edge (or lateral canthus) of the eye.
  - Tears drain thru small opening in the inner (or medial canthus), the nasolacrimal duct into the nose.
  - Tears also protect from infection

- Normally eyes produce 1ml of lacrimal fluid each day
- Chemical and mechanical irritants cause an oversecretion
- Tears contain lysozyme an enzyme that inhibits growth of bacteria on the eye

- B. Eyeball
  - Is a hollow sphere that sits within the orbit
  - Held in place by six extrinsic muscles attached to the orbit and the outer surface of the eyeball
    - 4 rectus muscles that move the eyeball side to side and up and down
    - 2 oblique muscles that rotate the eye

- The eyeball is made up of 3 layers of tissue:
  - Sclera and cornea
  - Choroid layer
  - Retina

- Sclera – tough protective outer layer – white of the eye
- Cornea – is connected to the sclera. It is transparent and is over the eyeball.
  - One of the structures that allows light rays to pass
  - Sensitive to touch/pain

- Minor irritations will stimulate a blinking reflex
- Often removed after death as a tissue for transplant
- 1st tissues used for transplant

- Choroid layer
  - The middle layer
  - This is a vascular layer
  - Brings oxygen and nutrients to the eyes
  - The anterior part of the choroid layer is made up of the ciliary body and the iris

- Ciliary body
  - Is a muscle
  - The shape of the lens is changed by the ciliary muscle which permits the focusing of light from objects at varying distances
  - Secretes aqueous humor which flows through the anterior and posterior chambers of the eye

- Anterior chamber
  - Space behind the cornea and in front of the iris
- Posterior chamber
  - Begins behind the iris

Aqueous humor maintains intraocular pressure (pressure within the eye)

Usually about 24mmHg

- The aqueous humor also provides nutrients and oxygen to the avascular (areas without blood vessels) lens and cornea.

- Over the front of the eyeball, the choroid develops into a pigmented section called the IRIS

- Iris
  - Gives the eye its specific color
  - The amount of pigment in the eye gives it color.
  - Increased pigment = increased color

- Inside the iris are muscles that control the size of the opening, its black center, the pupil

- The pupil
  - Regulates the amount of light entering the eye by dilating and constricting

- The lens
  - Is a structure immediately behind the iris
  - Major role is to focus light rays on the retina
  - The space behind the lens is filled with a transparent gelatin-like material called vitreous humor

- Vitreous Humor
  - Helps maintain the eyeballs shape and contributes to intraocular pressure
    - Loss of vitreous humor causes blindness

- Retina
  - Contains the receptors of the optic nerve
  - Contains specialized neurons called:
    - Rods
      - Night vision - scotopic vision
    - Cones
      - Photopic vision – function in bright light/daylight
      - Permit the perception of light, dark, color

- The optic nerve (cranial nerve II) carries the stimuli for vision from each eye
- These stimuli go to the brain's occipital lobe (visual, sensory area) where they are interpreted

- The opthalmic nerve – carries sensations of eye pain and temperature to the brain.
- The oculomotor nerve -

- The trochlear nerve – assists with some voluntary eyeball movements
- The abducens nerve – cranial nerve VI coordinates with cranial nerves III – IV to move the eyes

- C. Physiology of Vision
  - Vision involves the focusing of light rays on the retina and the transmission of the nerve impulses to the visual area of the cerebral cortex.

Effect of Aging on the Eye

- A. Most common changes occur in the lens:
  - 1. Less elastic not able to accommodate well enough to see close objects
    - Called presbyopia - farsightedness

- Presbyopia
  - Usually occurs between 40 – 45 yrs old
  - Glasses with bifocals or trifocals correct the situation

- 2. Cataracts – clouding of the lens or opaque lens
  - May occur at any age
  - Corrected when interferes with daily living
  - Surgically removed
  - Artificial lens implanted

Other changes:

p. 233 Rosdahl Table 21-2

III. Assessment of the EYE

- A. Subjective Data
  - 1. Family history
    - A. glaucoma
    - B. diabetes
    - C. blindness
    - D. cataracts
    - E. general health e.g., elevated BP
    - F. medications
    - G. any visual changes

- B. Objective Data
  - 1. visual acuity
    - A. Snellen's chart – letters
    - (E) chart – illiterate
      - Stand 20 feet away 20/20 normal
      - Visual impairment – 20/70
      - Legally blind – 20/200

- Done on both eyes covering one at a time
- Take glasses off for the test
  - If glasses on needs to be indicated with or without correction

- Visual fields by confrontation
  - Tests to see peripheral objects
    - Examiner stands 2 ft. in front of pt.
    - Instruct pt. to cover an eye
    - Examiner covers the opposite eye
    - Examiner uses arm opposite the covered eye

- Muscle balance eye movement
  - Follow finger without moving head
    - 1. check six cardinal fields p. 891

      figure 48-3

      if okay said to have adequate extraocular muscle strength

- Nystagmus – involuntary cyclical rapid movement of the eyes.

- 4. another test for muscle balance
  - Corneal light reflex test
    - Have client stare straight ahead. Shine a pen light toward cornea. The light reflection should be at exactly the same place on both pupils.

- 4. Pupillary Reflexes
  - Observe pupils for symmetry. Should be round, symmetrical and reactive to light
  - Slightly darkened room works best
  - Look straight ahead

- Note size of pupil
- A penlight is shown toward the pupil from a lateral position and the movement of the pupil is observed
- Pupil should quickly constrict
- Repeat procedure for opposite eye

- Tests for accommodation
  - Accommodation
    - Ability of the pupil to respond to near and far distances
    - If perform accommodation PERRLA
      pupils, equal, round reactive to light
      accommodation
    - If accommodation not tested PERRL

- Exam of external structures
  - A. Start with eyebrows
    - Symmetry
    - Hair texture
    - Size
    - Extension of brow

- B. Palpate orbital area
  - Edema
  - Lesions
  - Puffiness
  - tenderness

- C. Eyelashes
  - Redness
  - swelling
- D. Eyelid
  - When open should cover the iris but not the pupil
  - Distance between upper and lower eyelid known as the palpebral fissure should be equal

- If not symmetrical – observe for ptosis (drooping of the eyelid) commonly seen in stroke patients
- Pull lower eyelid down have pt. look upward. Conjunctiva and sclera are inspected for color and discharge
- To inspect upper eyelid use a cotton tipped applicator roll upward. Pt. blinks to return eyelid to normal position

- Internal eye exam is done by the advanced practitioner
- LPN may be required to explain procedure to the pt. and assist in the exam

- Opthalmoscope
- Opthalmologist
  - Slit lamp microscope

- Tonometer
  - Measuring intraocular pressure

    one type uses a puff of air to make an indentation in the cornea

Readings above normal range may indicate glaucoma

- C. Diagnostic Tests
  - Culture – exudate from eye is cultured; results determine if antiinfective treatment is necessary.
  - Fluorescein angiography – used to monitor, treat and diagnose eye diseases

- Must assess for allergies first
- Pupil is dilated
- Fluorescent dye is injected into venous system
- Observed under a slit lamp microscope

– 3. Electroretinography

- Useful in diagnosing diseases of rods/cones
- Measures differences in the electrical potential between cornea and retina in response to light waves
- Use contact lens with electrodes directly on the eye

- Ultrasonography
  - Eye is anesthisized
  - Transducer probe placed on the eye
    - Done like any other ultrasound
    - Must keep eye and head still

– Radiological tests

- X-rays used to view bone structure and tumors
- CT/MRI's – used to visualize ocular structures and abnormalities of the eye and surrounding tissue

- IV. Care of the Eye
  - Exams
  - Eye care providers
    - Opthalmologist
    - Optometrist
    - Optician

- Eye hygiene
  - Keep debris out
  - Don’t rub eye
  - Wiping eye

- Nutrition – eyes need adequate nutrition as well
  - Eye disorders related to inadequate vitamin intake
    - Include corneal damage and night blindness from lack of Vitamin A
    - Optic neuritis – results from Vitamin B deficiency

- Safety
  - Common household activities contribute to a majority of eye injuries
    - Cooking
    - Lawn care
    - Shooting rubber bands
    - Throwing dirt/rocks

- Irrigation p. 894

F. Medication Administration

- 1. Eye drops

- 2. Eye ointments

- G. Eye patching
  - Done to treat an injured or infected eye
    - Wants to keep eyelid shut
    - Place gauze over eye
    - Sometimes additional metal shield is placed over the soft pads to protect eye from external injury
    - Taped in place

- Suggest quiet activities for patient
- Pt. watching television or reading is not encouraged. Because patched eye will attempt to move with nonpatched eye

Anatomy of Ear

- Ear consists of three areas:
  - Outer
  - Middle
  - Inner

- A. Outer
  - Made up of auricle (or pinna) and the ear canal
    - Auricle – made of cartilage covered with skin
    - Ear canal – tunnel into the temporal bone that curves slightly forward and downward

- Ear canal
  - Is lined with skin that contains ceruminous glands
    - A. cerumen or ear wax is the secretion that keeps the ear drum pliable because it is sticky and traps dust.

- Middle ear – is an air filled cavity
  - The eardrum (tympanic membrane) is stretched across the end of the ear canal and vibrates when sound waves strike it.
    - These vibrations are transmittedd to the three auditory bones
      - Malleus
      - Incus
      - stapes

- The stapes then transmits vibrations to the fluid filled inner ear.

- The eustachian tube (auditory tube) extends from the middle ear to the nasopharynx and permits air to enter or leave the middle ear cavity

- The air pressure in the middle ear must be the same as the external atmospheric pressure for the eardrum to vibrate properly

- Swallowing or yawning opens the eustachian tubes and permits equal pressure

- Inner Ear – is a cavity in the temporal bone called the bony labyrinth lined with a membrane called the membranous labyrinth
- Fluid between bone and membrane is called perilymph
- Fluid within the membrane is called endolymph

- Membranous structures are:

- A. Cochlea
- B. Utricle
- C. Saccule
- D. Semicircular canals

- Effects of Aging on the Ear
  - Cumulative damage to hair cells in the Organ of Conti usually becomes apparent after the age of 60
  - Hair cells can not be replaced usually damaged by noise

- High pitched ranges are usually lost first called presbycusis. Hearing may stillbe adequate for lower pitched ranges

- High pitched sounds f,s,k, and sh are usually lost first.

Becomes more difficult to filter out background noises making it difficult to hear conversations

Pitch does not equal loudness so it is not helpful to talk louder to a pt. with this type of hearing loss

Nursing Assessment of the Ear

- Assessment includes:
  - Obtain pts. Health history
  - Perform a physical exam
  - Subjective Data
    - Assessment of symptoms
    - Ask WHAT'S UP question
    - Medications (ototoxic)
    - surgeries

- Treatments
- Allergies
- Habits
- Use of hearing devices
- Family history
- Hygiene
- Ear protection
  - employment

- Symptoms and complaints related to the ear include:
  - Decreased or loss of hearing
  - Discharge (otorrhea)
  - Ear pain (otalgia)
  - Itching, fullness tinnitus
  - Vertigo

- B. Objective
  - Observe behaviors of the pt.
  - Inspection of the ear
    - Size
    - Symmetry
    - Configuration
    - Angle of attachment
    - Note deformities/scars
    - Check for s/s infection

- Tip head to side look in ear with penlight or otoscope
  - Note any drainage, wax, color, odor clarity, lesions, foreign bodies, erythema or edema
  - Always check ear before taking temp.
  - Check accuracy

– Palpate auricles (cartilidge) for tophi; lesions

- Tophi – deposits of uric acid crystals that appear as small hard nodules. May also appear in gout

- A downward protrusion of the helix called Darwin's tubercle is a normal finding

- Auditory Acuity Testing
  - A. Whisper voice test – occlude one ear, stand 1-2 ft. away whisper a two syllable word. Pt repeats back what you said. Check other ear ask pt. if hearing better in one ear or the other
  - Methods to prevent lip reading

B. Rhinne Test

used to differentiate between conductive and sensorineural hearing loss.

strike tuning fork

place on pts. Mastoid process

tell pt. to tell you when they can't hear it anymore then place 2 inches in front of the ear

- Normally air conduction (AC) is heard twice as long as bone conduction (BC)

- Normally AC > BC

- Weber Test
  - Uses tuning fork
  - Place vibrating fork on the center of the patients forehead or head
  - Ask pt. if he/she can hear the tuning fork
  - Then ask if sound better in right ear, left ear, or same in both

- Balance Testing- done for complaints of dizziness, nystagmus, problems with equilibrium
  - Observe patients gait note unsteadiness

- Otoscopic examination
  - Otoscope used to visualize external ear, ear canal or tympanic membrane
  - Helps to identify infections, remove wax or foreign objects

- Ear canal
  - Should not be red, scaly or swollen
  - No drainage, nodules, foreign objects or excessive wax

- Internal otoscopic exam is done by an experienced practicioner.
- The eardrum should appear slightly conical, shiny, smooth and pearly gray incolor

- Diagnostic Tests
  - Audiometric testing – determines the type and degree of hearing loss. Pt. placed in a sound proof both
  - Tympanometry – varying amounts of pressure are applied to the tympanic membrane. Response is recorded on a graph. Transient vertigo is a possible side effect. Report nausea/ dizziness during test.

– Caloric Test

- Warm water instilled into the ear canal. This stimulates the endolymph of the semicircular canals which stimulate movement of the head
- Nystagmus is a normal response
- No Nystagmus signifies disease of labyrinth such as Meniere's disease
- Pt. may also experience dizziness

- Caloric Test contraindicated if patient has a perforated tympanic membrane

- Electronystagmogram
  - Used to diagnose causes of unilateral hearing loss
  - Test completed in a dark room
  - 5 electrodes taped to pts. Face at positions around the eye. Electrodes measure nystagmus; response to vestibular stimulation

- Measurements taken under a variety of situations
- Some medications held for 1-5 days before the test
- Tobacco and caffeine avoid on day of the test.
- Contraindicated in pts. With pacemakers

- CT scan – useful in visualizing the temporal and mastoid bones, the middle and inner ears and the eustachian tube
- MRI – useful in differentiating between healthy and diseased tissue. Contraindicated in pts. with heart valves, surgical and aneurysm clips and orthopedic screws.

- Laboratory Tests
  - Cultures – identify infection organism causing it. Obtained by a cotton-tipped applicator
  - Pathological Exam – tissue obtained during surgery usually to rule out a malignancy
  - A cholesteatoma (cyst of epithelial cells and cholesterol) found in the middle ear

- Care of the Ear
  - A. Medications
    - To treat ear disorders include:
      - Antinfectives
      - Antinflammatories
      - Antihistamines
      - Decongestants
      - Cerumenolytics
      - Diuretics

- Anti-infectives – administered systemically or as a topical solution
- Anti-inflammatories, anti-histamines and decongestants used with acute infections to reduce nasal and middle ear congestion
- Cerumenolytics – used to soften cerumen and remove it from the ear canal

- Diuretics – used to reduce pressure caused by fluids

- Administration of Ear drops
- Health Maintenance
  - Table 48–3 Williams and Hopper

- Hearing Aids
  - Instruments that amplify sound
  - Should be turned of and batteries removed when not in use
  - When turning on increase volume til it squeals
  - Cleanse at least weekly

- Cochlear implant
  - Microelectronic processor placed in the cochlea delivers electrical stimuli to the auditory nerve
  - Patients commonly have difficulty understanding and learning speech even with the cochlear implant

- Diet
  - Hearing problems do not usually have any diet modifications
  - Pts. With Meniere's Disease may benefit from a low sodium diet to prevent retention of fluid

Disorders of the EYE

- Infections and inflammation
  - Conjunctivitis – pink eye
    - Inflammation of the conjunctiva the membrane lining the eyelids and covering the sclera
    - Very contagious

- Causes
  - Bacterial infection
  - Viral infection
  - Rickettsial infection
  - An allergy

- Signs and symptoms
  - Pain
  - Redness
  - Swelling
  - Itching
  - Sometimes purulent drainage

- Nursing implications
  - Handwashing
  - Wear gloves
  - Disinfect the clients linen

- Treatment
  - Antibiotic ointment or eye drops
  - Antiviral medications
  - Avoid allergens
  - Take anti-histamines
  - Saline or boric acid irrigations
  - Warm soaks

- Blepharitis
  - Inflammation of the eyelid caused by excessive dryness of the eyes, excessive oiliness of the skin or infection
  - s/s
    - Red lid margins
    - Purulent drainage

- Treatment
  - Warm soaks
  - Cleanse eyelid with soap and water
  - Apply antibiotic opthalmic ointment
  - Prevent recurrence

- Hordeolum (stye) – is an acute inflammation of an oil or sweat gland of the eyelid

- s/s
  - Red swollen
  - Raised painful
  - May contain pus

- Treatment
  - Warm compresses
  - Antibiotic ointment
  - Abscess excised and drained
  - Teach pt. not to squeeze a stye, this will spread infection

- Chalazion
  - An accumulation of lipid (fatty) material from a chronically obstructed meiboman gland
  - If the lesion does not affect vision leave them alone otherwise excise or drain

- Trachoma
  - Rarely seen in the U.S.
  - Form of conjunctivitis
  - Found in dry hot climates
  - Caused by: Chlamydiatrachomatis
  - Highly communicable
  - Tx: topical and systemic antibiotics

- Keratitis – inflammation of the cornea
  - Caused by bacterial, viral or fungal infections
  - s/s:
    - pain, blurred vision, purulent drainage
    - Sensitivity to light (photophobia)
    - Redness of sclera

- Corneal ulceration is a common result.

- Herpes simplex keratitis – most common cause of unilateral visual loss from infectious keratitis in the United States

- Treatment
  - Cultures
  - Eye drops to dilate the pupil
  - Antibiotic drops given hourly for bacterial infections
  - Antiviral and antifungal therapy as necessary

- Refractive Errors – are when light rays entering the eye do not focus on the retina s they should

- s/s of refractive errors
  - Holding objects at a distance
  - Squinting
  - headaches

- Ametropic Disorders
  - Hyperopia – elongated eyeball, farsightedness
  - Myopia – shorter than normal eyeball, nearsightedness
  - Astigmatism – equal curvature, light rays focus on two different points on the retina; leads to distorted vision

– Presbyopia – loss of elasticity of the lens; light rays focus at a point behind the retina. Decreased close vision

- Diagnostic tests
  - Refractive exam – pupils may or may not be dilated
  - Medications used to dilate pupils:
    - Cyclogyl
    - Mydfrin
    - Neo-synephrine
    - Isopto-hyoscine
    - Mydriacyl

- Treatments
  - Corrective lens

- Disorders of the eye
  - Blindness p. 909 Williams/Hopper

- D. Diabetic Retinopathy
  - 1. Three stages

    background retinopathy

    pre-proliferative retinopathy

    proliferative retinopathy

- Background retinopathy Stage 1
  - Earliest stage
  - Microaneurysms
  - Blood leaks into retina
  - Leakage causes edema
  - Pt. Will not notice decrease in color discrimination and visual acuity

- Pre-proliferative retinopathy Stage 2
  - Chara. By swollen and irregularly dilated veins which results in sluggish or blocked blood flow
  - Pt. Unaware of this stage
  - No symptoms

- Proliferative retinopathy Stage 3
  - Chara. By the formation of new blood vessels growing into the retinal and optic disc area to increase the blood supply to the retina
  - The newer vessels may grow into the vitreous causing a traction effect, pulling the vitreous away from the retina and as a result pulling the

- Retina away from the choroid causing retinal detachment
- At this stage vision is lost

- Diagnostic tests for Diabetic Retinopathy
  - Examination with opthalmoscope
  - retinoangiography

- Medical Treatment
  - Stop the leakage of blood and fluid into the vitreous and retina
  - Leaking microaneurysms are sealed byuse of laser photocoagulation
  - If blood has leaked into vitreous, a vitrectomy is performed removal of material replaced with NSS or silicon oil supports structures of the eye

- E. Retinal Detachment
  - Separation of the retina from the choroid layer of the eye that allows fluid to enter the space between layers
  - Three types of retinal detachment

- 3 types of retinal detachment
  - 1. Rhegmatogenous
  - 2. Nonrhegmatogenous
  - 3. Exudative detachment

- Rhegmatogenous
  - Caused by a hole or tear in the retina
  - Caused by trauma such as stooping/ ifting weights or direct eye trauma

- Nonrhegmatogenous

  fibrous tissue attaches to the retina and pulls retina away from normal position

  occurs in pts. with sickle cell disease or diabetes mellitus

- Exudative detachment
  - Occurs when fluid or exudate accumulates in the subretinal spaces and separates the layers
    - Occurs most often in pts. with advanced hypertension, preclampsia/eclampsia or intraocular tumors

- s/s retinal detachment
  - Sudden change in vision
  - Flashing lights and then floaters
  - Looking through a veil
  - Cobwebs
  - Final curtain falling
  - darkness

There is no pain because retina does not contain sensory nerves

- Diagnosis- observation with opthalmoscoope
  - Slit lamp examination will magnify the lesions

- Medical treatment
  - Laser reattachment
    - Used if small area affected
  - Cryosurgery
  - Scleral buckling
  - Pneumatic retinoplexy

- Cryosurgery
  - Super cooled probe on the sclera. Probe causes injury to the tissue forming an adhesion

- Scleral Buckling
  - Surgical procedure placing a silicon implant with a beltlike device around the sclera to bring the choroid in contact with the retina

- Pneumatic retinoplexy
  - Time consuming procedure
  - Inject air or gas into the chamber to hold the retina in place
  - Must recline for 16 hours prior to the procedure to allow the retina to fall back toward the choroid

- Because the air rises pt. must recline for 8 hours a day for 3 weeks
- With any retinal reattachment procedures there is a risk of intraocular pressure and recurrent detachment

- Glaucoma
  - A group of diseases characterized by abnormal pressure within the eyeball
  - Pressure causes damage to cells of the optic nerve
  - Damage is silent, progressive and irreversible until end stages

- When loss of peripheral vision occurs followed by reductions in central vision and eventually blindness
- Once a pt. has glaucoma they always have it. Tx. necessary to maintain stable intraocular eye pressures

- 2 types of glaucoma
  - POAG – primary open angle glaucoma
  - AACG – acute angle closure glaucoma
    - Glaucoma unilaterally
    - Sudden onset

- AACG – anatomically narrowed angle where the iris meets the cornea and nearby structures occlude the flow of aqueous fluid
  - Considered a medical emergency and results in partial or total blindness if not treated
  - Highest among Asians
  - Women older than 45
  - Nearsighted individuals

- POAG – occurs when the drainage system of the eye degenerates and blocks the flow of aqueous humor
  - Increases in individuals >40
  - >50 for European Americans
  - >35 for African Americans

- Persons with diabetes
- Family history of glaucoma
- 4 – 5 times more prevalent in African Americans than European Americans

- s/s AACG
  - Unilateral rapid onset
  - Severe pain over the affected eye
  - Blurred vision
  - Rainbows around lights
  - Photophobia
  - Tearing ; N & V with increased IOP

- s/s POAG
  - Develops bilaterally
  - Onset gradual and painless
  - Mild aching in the eyes
  - Headache, halos around lights
  - Frequent visual changes not corrected with glasses

- Tx.: focuses on opening the aqueous flow by administering cholinergic agents (miotics) to constrict the pupil
- Secondly medication given to slow the production of aqueous fluid
  - Carbonic anhydrase inhibitors
  - Beta blockers

- 3Rd steroids given to reduce inflammation
- 4Th Mannitol – a hyperosmolar agent to rapidly reduce the IOP
- 5th analgesics to reduce pain
- Surgery is done when no longer able to control the flow of aqueous humor or IOP

- Cataracts – opacity in the lens of the eye that causes loss of visual acuity. Light rays cannot get to the retina through the clouded lens

Contributing Factors

- age
- ultraviolet radiation
- diabetes
- smoking
- steroids
- nutritional deficiencies
- alcohol consumption
- intraocular infections
- trauma
- congenital defects

- Signs and symptoms
  - Halos
  - Difficulty reading fine print or seeing in bright light
  - Increased sensitivity to glare
  - Double or hazy vision
  - Decreased color vision

- Preoperative care for eye surgery
  - Rosdahl p. 1111
  - Hopper p. 930

- Post operative care following eye surgery

- Macular degeneration
  - ARMD – age related macular degeneration
    - Leading cause of visual impairment in U.S. residents older than 50
    - Involves deterioration in the macula
      - Area on the retina responsible for sharp central vision needed for reading and seeing small objects
      - Also responsible for color vision

- 2 types
  - Dry – (atrophic) – photoreceptors fail to function and are not replaced because of age. Accounts for 70-90% of cases
  - Wet – (exudative) – retinal tissue degenerates causes retinal edema. Scar tissue is formed severely limits central vision

- People at risk:
  - >60 years old
  - Family history of macular degeneration
  - Diabetes
  - Smokers
  - People exposed to ultraviolet light
  - caucasian

- s/s macular degeneration
  - Dry
    - Slow progressive loss of central and near vision
    - Each eye can be affected to different degrees

- s/s continued
  - Wet
    - Sudden onset
    - Loss central and near vision
    - Can occur in one or both eyes
    - Blurred vision
    - Distortion of straight lines
    - Dark or empty spot in the central area of vision

- Diagnostic Tests
  - Amsler Grid p. 918

- Treatment of Macular Degeneration
  - Dry
    - No treatment
    - Most do not lose peripheral vision or become totally blind
    - But most are classified as legally blind (less than 20/200 with correction)

– Wet

- If diagnosed early argon laser photocoagulation can seal the leaking blood vessels which decrease the rate of vision loss.
- There is a small blind spot at the point of laser contact which is permanent

- Eye Trauma
  - Injuries to the eye include:
    - Foreign bodies
    - Burns
    - Abrasions
    - Lacerations
    - Penetrating wounds
      - Great risk for infection of blindness

- Foreign bodies are the most common cause of corneal injury

- Diagnostic Testing

- Tx: for chemical burns and sudden painless loss of vision initiate immediately to preserve vision

- Medical Treatment
  - Foreign bodies
    - Saline flush
    - Topical antibiotic ointment
  - Chemical burns
    - 15-20 minutes irrigation tap water,or sterile solution
    - Antibiotic ointment

- Burns from heat or ultraviolet light are not irrigated

- Abrasions/lacerations treated with anti-infective ointments or drops after cleaning the eye with normal saline

- Penetrating wounds
  - IMMEDIATELY
    - Cover both eyes to prevent ocular movement
    - Protruding object should be stabilized but not removed

V. Disorders of the Ear

- Hearing Loss
  - Most common disability in the U.S.
  - Can be acquired or congenital
  - Hearing impairment ranges from difficulty understanding words, hearing certain sounds to total deafness
  - Can affect communication, social and work activities.

- Types
  - Conductive
  - Sensorineural

- Conductive
  - Any interference with the conduction of sound impulses through the auditory canal, eardrum, or middle ear
  - It is a mechanical problem

- Causes of conductive hearing loss
  - Cerumen
  - Foreign bodies
  - Infection
  - Perforation tympanic membrane
  - Trauma
  - Fluid
  - Cysts, tumors

- Otosclerosis
  - definition

- Sensorineural
  - Sensory - originates in the cochlea, involves hair cells and nerve endings
  - Neural – originates in the nerve or brain stem
    - Sensorineural hearing loss results from disease or trauma to the sensory or neural components of the inner ear

- Causes
  - Infections (measles, mumps, meningitis)
  - Ototoxic drugs
  - Trauma
  - Noise
  - Neuromas
  - Arteriosclerosis
  - Aging process

- Presbycusis
  - Hearing loss caused by aging process
  - Results from degeneration of the Organ of Corti
  - Usually begins in 5^{th} decade of life
  - Develops inability to decipher high frequency sounds (consonants) s-z-t-f-g

- Misc.

- Difficulty understanding what is being said in noisy environments

- Aging individual commonly has more difficulty understanding higher pitched female voices than lower pitched male voices

- Psychogenic hearing loss
  - Functional hearing loss
  - Hearing loss with no organic cause
  - Precipitated by emotional stress

- Medical Tx.

- Surgical Treatment
  - Cochlear implants – able to restore up to ½ of the patients hearing

- Nursing Management
  - Identify pts. at risk for hearing impairment
    - Patients with renal or hepatic disease
    - Using two or more ototoxic drugs

- Monitor s/s vertigo
- Horizontal nystagmus
- Nausea and vomiting
- Spinning
- Rocking sensation while sitting still

- Nursing process
- Nursing Diagnoses
- Nursing Interventions

External Ear Disorders

- Infection – most common disorder of the external ear.
  - External otitis (ear piercing)
    - Most common infection
    - Caused by bacterial and fungal pathogens (Staphylococci most common organism)
    - Exposure to moisture, contamination or local trauma provides environment for infection (e.g. swimmer's ear)

- Furuncle – localized infection when a hair follicle becomes infected
- Carbuncle – when hair follicles become infected and form an abscess
- Otomycosis – infection caused by a fungal growth; seen after topical corticosteroid or antibiotic use
- Occurs more often in hot weather

- Perichondritis – infection of the auricle which can result in necrosis of cartlidge

- Definition of auricle:

- Signs and symptoms
  - Pain – most common
    - Gentle pulling, moving jaw, otoscope
  - Pruritis
  - Swollen
  - Redness
  - Drainage
  - Temperature

- Diagnosis
  - CBC
  - Cultures
  - Rinne Test
  - Weber Test

– Impacted Cerumen

- Working dusty dirty places
- Large amounts of hair in ear
- Improper cleaning
- Pts. With hearing aids

- Signs and symptoms
- Whisper, Rinne, and Weber tests indicate conductive hearing loss
- Removing Cerumen p.926

- Masses
  - 1. Benign masses of external ear are usually cysts from sebacous glands
  - Other benign masses
    - Lipomas
    - Warts
    - Keloids
    - Infectious polyps

– Actinic keratosis – precancerous lesion found on the auricle

– 2. Malignant tumors
  - Basal cell carcinoma on the pinna
  - Squamous cell – in the ear canal

  - Tumors spread to surrounding tissue and bones if not treated

- s/s ear masses
  - Changes in appearance of skin
  - Impaired hearing
  - Pain – chara. Deep pain radiating inward on the affected side
  - Ear drainage
  - Facial paralysis as progresses

- Diagnosis
  - Visualization
  - Biopsy
  - X-rays
  - Audiometric studies

- Trauma
  - Commonly caused by:
    - Blow to the head
    - Automobile accidents
    - burns
    - Foreign bodies cold temperatures

- s/s trauma to external ear
  - Lacerations/ contusions
  - Hematomas
  - Erythema
  - Blistering
  - Numbness
  - Pain
  - Itching
  - Decreased hearing

– Repeated trauma

- Can cause hypertrophy
- Known as cauliflower ear common in boxers

- Complications of external ear disorders
  - Metastasis
  - Infections
    - Cellulitis
    - Abscesses
    - Middle ear infection
    - septicemia

Middle Ear disorders

- Infections
  - Otitis media – inflammation of middle ear
  - Children vulnerable

- 3 types of otitis media
  - Serous
  - Acute purulent
  - Chronic purulent

- Serous
  - Caused by infection
  - Allergy
  - Tumors
  - Sudden changes in altitude

- s/s
  - Crackling sensations
  - Fullness in ear
  - Some hearing loss
  - If untreated fluid will rupture the ear drum

- Treatment
  - Antibiotics
  - Myringotomy
    - Surgical incision into the eardrum

- Acute purulent
  - Pus forms and accumulates creating pressure on the eardrum
  - s/s
    - Fever
    - Earache
    - Impaired hearing

- Complications
  - Spontaneous rupture of ear drum
  - Chronic otitis media
  - Meningitis

- Other problems include:
  - Nausea and vomiting
  - Dizziness
  - Facial paralysis
  - Brain abscess

- Chronic Purulent
  - Associated with punctured eardrum and mastoiditis
  - s/s
    - Ringing in ears
    - Hearing loss
    - Pain
    - Purulent drainage

- Treatment
  - Antibiotics
  - Mastoidectomy
  - Steroids – decrease inflammation

- Treatments for middle ear infections
  - Myringotomy – puncture of the ear drum
    - Releases pressure
    - Relieves pain
    - Healing proceeds rapidly
    - Drainage bloody then purulent
    - DO NOT PLUG EAR WITH COTTON

- Tympanoplasty
  - plastic reconstruction of the tiny bones of the middle ear

- Polyethylene tubes
  - Inserted through the ear drum into the middle ear
  - Allows for drainage

- Middle ear infections (cont.)
  - Otosclerosis
    - Interferes with the vibration f the stapes
    - Impairs or destroys hearing
    - Develops slowly
    - Heriditary/familial tendency
    - Most common cause of conductive deafness
    - First symptom - tinnitus

- Treatment
  - Hearing aides
  - Stapes mobilization
  - Stapedectomy
    - Clients may be able to hear immediately after prosthesis placement but return of hearing not necessarily permanent deafness may recur suddenly

- Trauma

Inner ear disorders

- Difficult to treat
- Surgery nor hearing aides help inner ear deafness (perceptive deafness)
- Drugs can harm inner ear (ototoxic)
- Streptomycin may injure the auditory nerve

- Treatment
  - Prevent further injury
  - Training in lip reading

- Labrythitis
  - Infection of inner ear
  - Caused by viral or bacterial pathogens

  - Serous labrynthitis
    - Sometimes follows drug intoxication or overindulgence in alcohol or allergy

- s/s
  - Vertigo
  - Tinnitus when cochlea involved
  - Sensorineural hearing loss
  - Nystagmus
  - Pain
  - Fever
  - Nausea and vomiting
  - ataxia

- Nursing Management Labryinthitis
  - Help pt. manage s/s self-care and safety issues
  - Avoid turning head too quickly to alleviate vertigo
  - Help pt. deal with anxiety over hearing loss

- Neoplastic Disorders
  - Most common benign tumor
    - Acoustic neuroma
    - Tumor of the eighth cranial nerves
      - Occurs at any age
      - Usually occurs unilaterally
    - Malignant tumors are rare

– s/s acoustic neuroma

- Unilateral hearing loss of high pitched sounds
- Unilateral tinnitus
- Intermittent vertigo
- Headache
- Pain
- Balance disorders

- Treatment
  - Involves surgical removal
  - Steroids and radiation decrease size of inoperable tumors

- Meniere's disease
  - Is a balance disorder
  - Cause unknown
  - Develops between 40-60 yrs of age
  - s/s range from vague to severe to debilitating

- s/s
  - Vertigo
  - Tinnitus
  - Irritability
  - Withdrawal
  - hearing loss
  - gait changes
  - depression

  - Vertigo can last 2-4 hours
  - Takes several weeks for s/s to resolve

- Pt. enters stage of remission til next attack
- Eventually pt. has complete remission with some degree of permanent hearing loss

- Medical treatment
  - Symptomatic
  - Tranquilizers
  - Salt restricted diet
  - Diuretics
  - Antihistamines
  - Vasodilators

- Pts. Should avoid alcohol, caffeine and tobacco
- Bedrest during acute attacks
- Pt. who don’t respond may be placed on low doses of methotrexate

- Surgical
  - Can include intratympanic gentamycin injection

- Nursing Care
    - Focuses on symptoms/safety
    - Emotional support