PATIENT CARE THEORY 2

UNIT 3, PART 1: Special Senses

Marilyn Niffin BSc, ACP
Professor Georgian College
Winter 2021, 2023

Special Senses

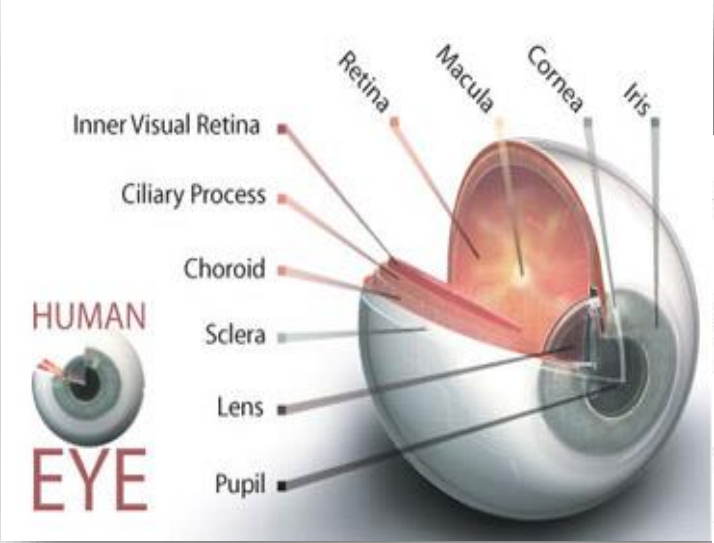
- Not typically life threatening
- Potentially life *altering*
- Require special attention
- Consideration for transport destination (specialty hospitals)

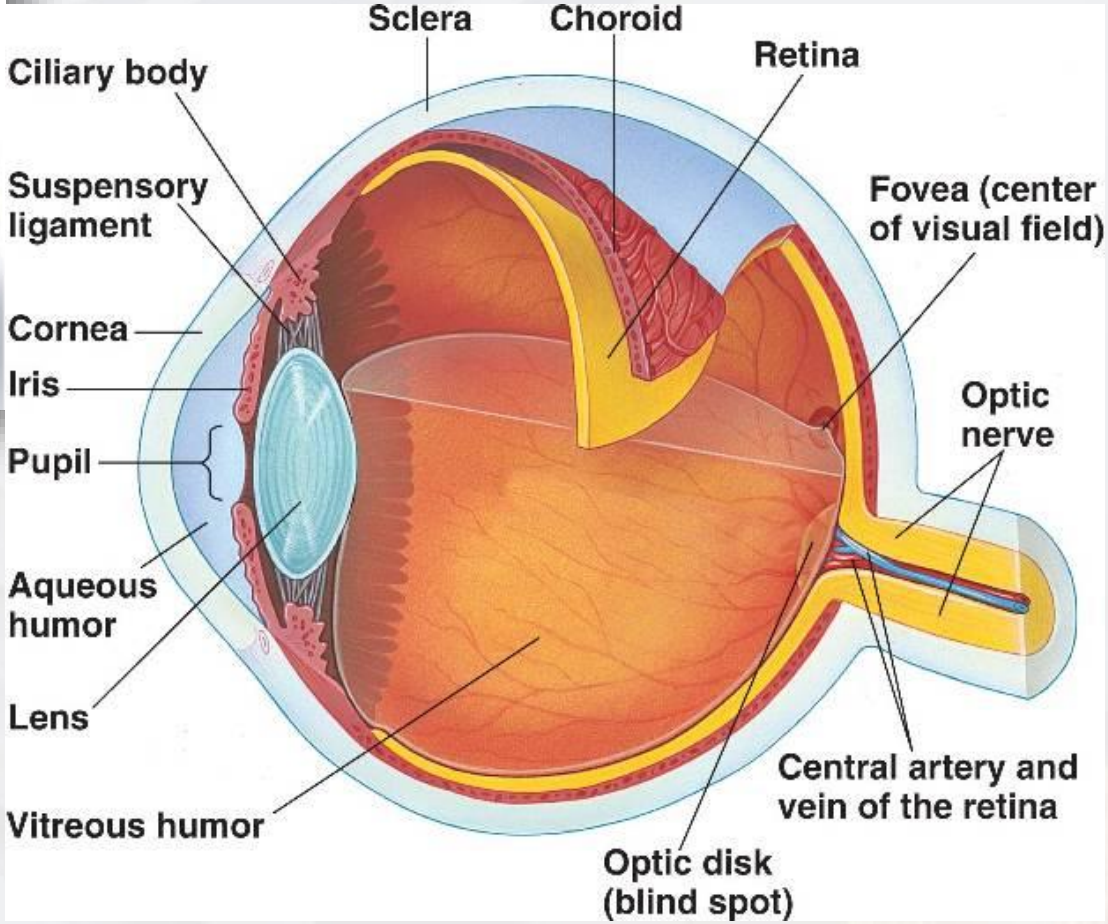
The Special Senses

- Vision
- Hearing
- Taste
- Smell
- Touch

EYES

Anatomy





Globe

The Eyes

- Are ~ 3 cm
- Housed within the orbits (eye sockets)
- Connective tissue and muscles hold them in place and allow for movement
- Lacrimal apparatus and glands provide tears and lubrication
- Include the sclera, cornea, conjunctiva, iris, pupil, lens, retina, anterior and posterior chambers.

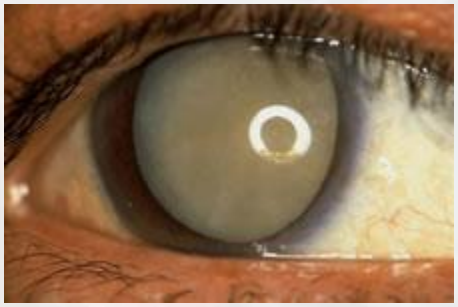
Eye Movement

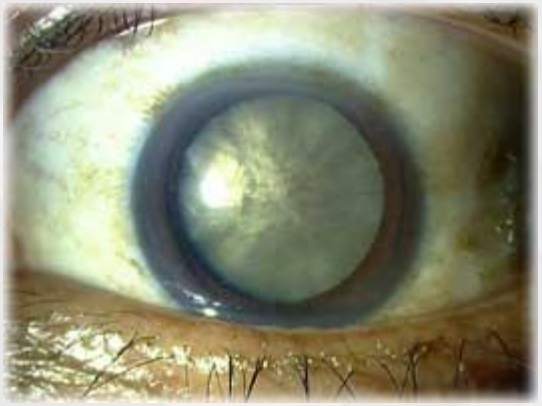
- 2nd and 3rd cranial nerves are directly related to vision pupillary reflex (CN –II senses light and CN III controls pupil reflex)
- CN-III– Oculomotor nerve -> innervates the muscles that move the eyeballs and the eyelids as well
- CN- IV(trochlear) and CN -VI (abducens) also control eye movement

Foreign/Impaled Objects

- Can cause significant bleeding (soft tissues are highly vascular)
  - If there is no injury to the globe, slight pressure may be applied to control the bleeding
  - However, if fluid is leaking from the globe **DO NOT APPLY PRESSURE!** This may increase the amount of fluid lost and lead to permanent blindness
  - Hyphema – blood in the anterior chamber of the globe
  - Burns or chemicals in the eye – requires flushing with clean or sterile water

Cataracts

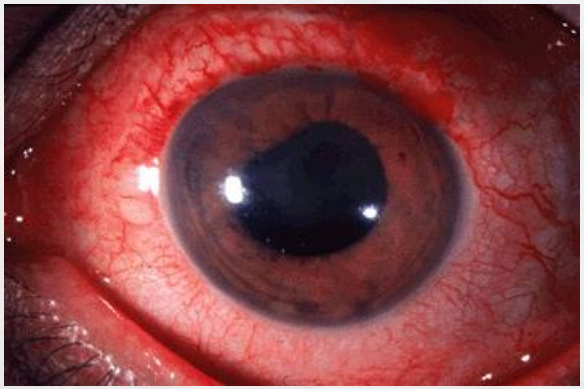


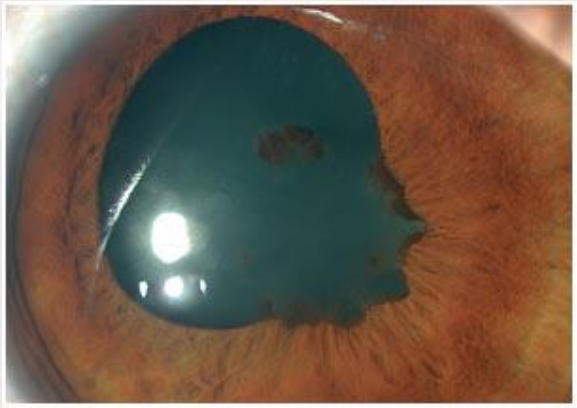


- Progressive thickening of the lens – “clouding” of the lens – i.e loss of transparency of the lens
- vision-impairing disease
- A leading causes of blindness
  - Decreased visual acuity
  - Increased glare
  - Diplopia

- Pupil(s) may not react to light

Iritis / Uveitis



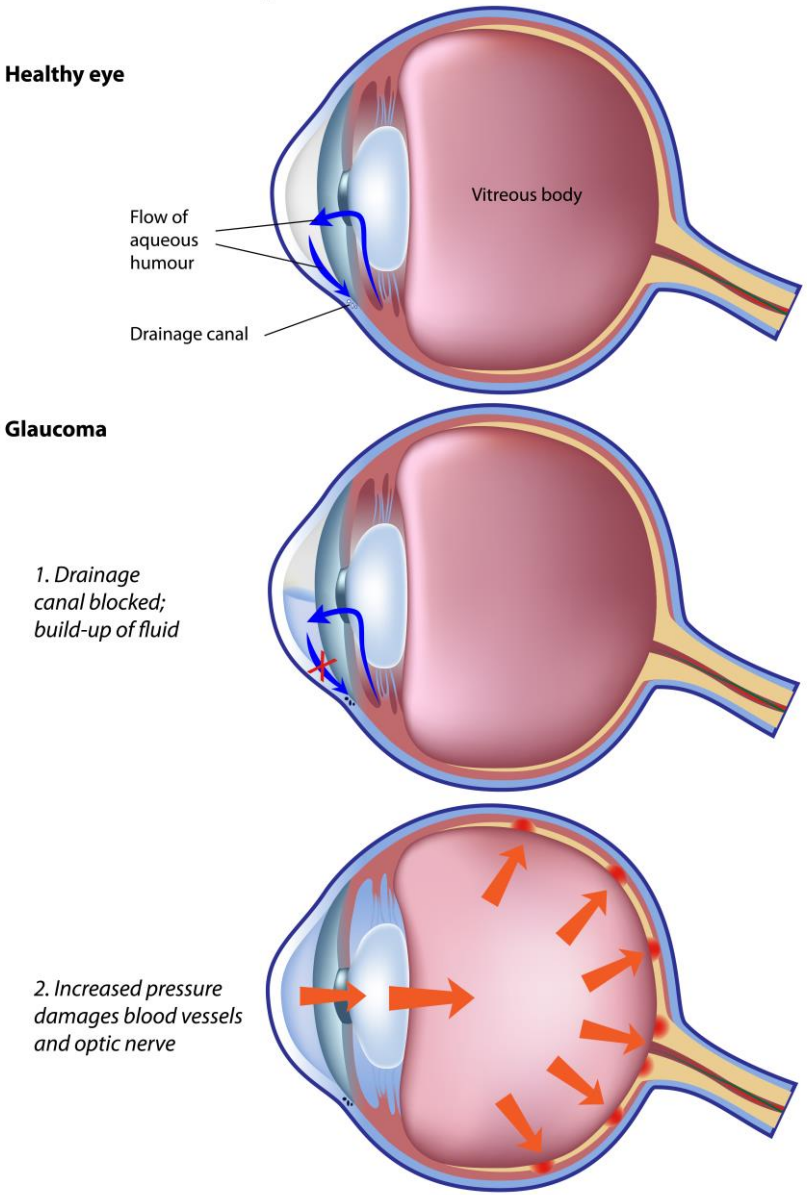


- vision-impairing disease
- Iritis: inflammation of the iris of the eye
- Uveitis: Inflammation of the uvea
  - Uvea: middle layer of the eye beneath the sclera
  - Includes: iris, ciliary body, and choroid. Provides most of the blood supply to the retina
- Pupil(s) may not react to light

Glaucoma

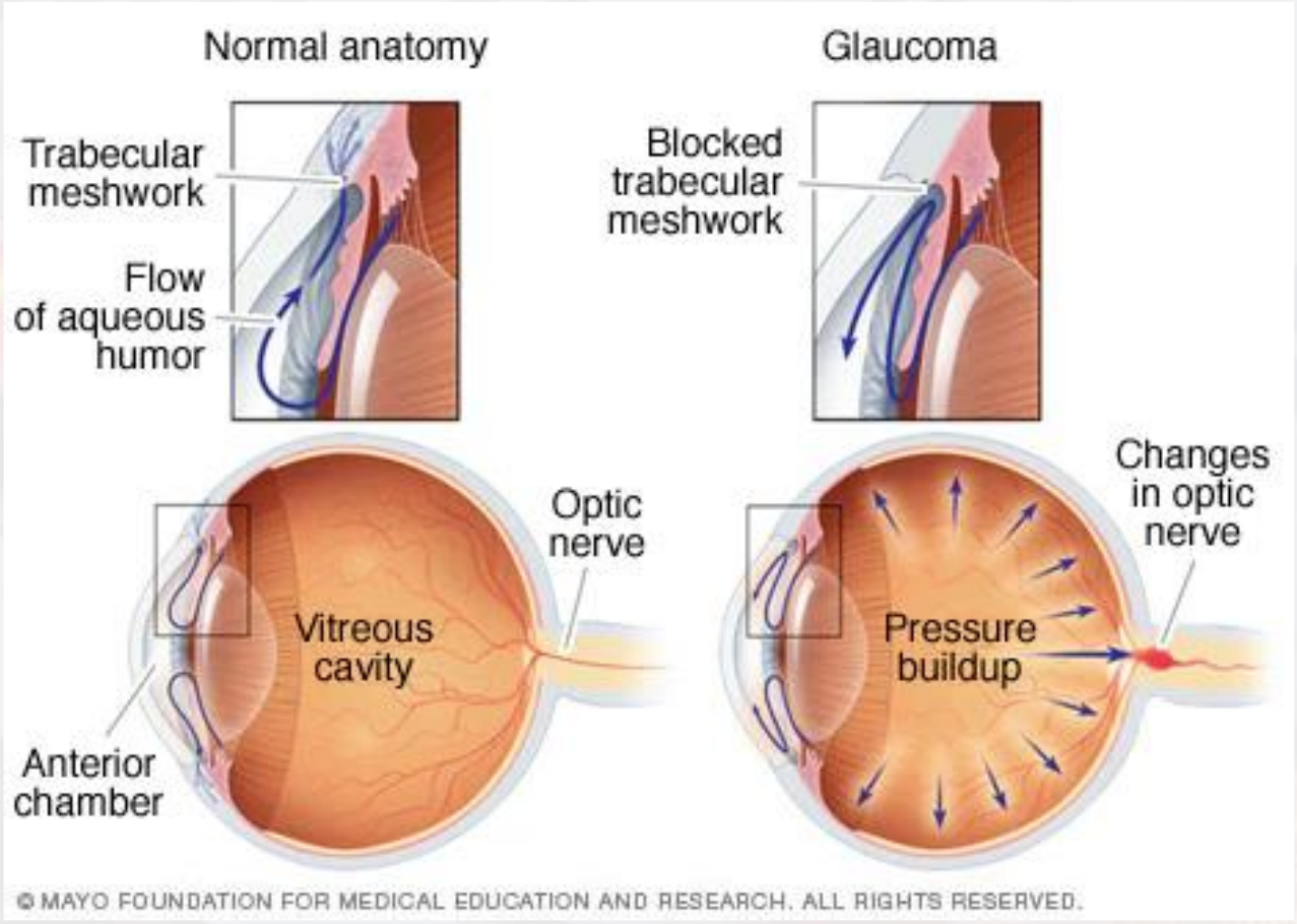
- term used for several ocular diseases that ultimately result in increased intraocular pressure (IOP) and decreased visual acuity
- Types:
  - Low-tension or normal-tension glaucoma
  - Acute angle-closure glaucoma (code 4)
  - Congenital glaucoma
  - Secondary glaucomas

Development of Glaucoma

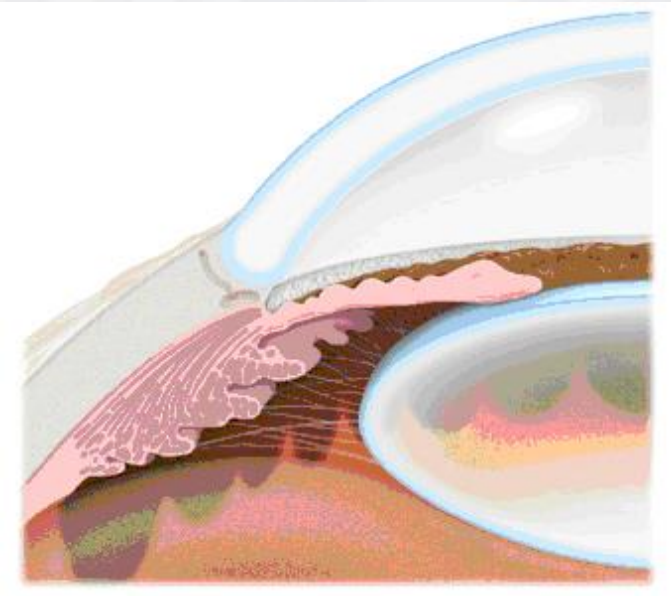


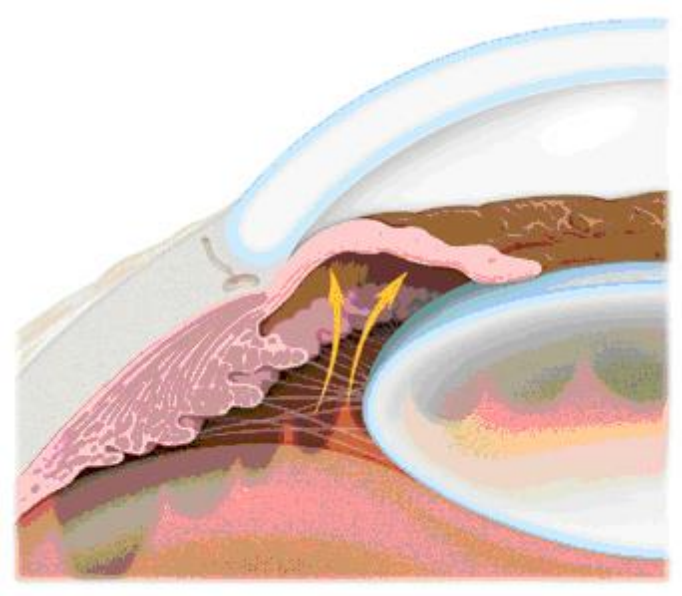
Glaucoma

- Acute angle-closure glaucoma:
  - **“painful loss/decrease in vision” (BLS Standards)**
  - fluid at the front of the eye cannot reach the angle and leave the eye
  - angle gets blocked by part of the iris
    - sudden increase in eye pressure causes damage to the optic nerve and retina
    - severe periorbital pain (boring in nature) and associated with an ipsilateral headache
    - nausea
    - redness of the eye; blurred vision or decreased visual acuity


Normal anatomy
Glaucoma
Trabecular meshwork
Flow of aqueous humor
Blocked trabecular meshwork
Optic nerve
Changes in optic nerve
Vitreous cavity
Pressure buildup
Anterior chamber
© MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH. ALL RIGHTS RESERVED.

Open vs Closed Angle Glaucoma





Normal → Glaucoma

Glaucoma

Prehospital management

- Keep patient at rest
- No eye patches, covers, or blindfolds
  - Have patient close their eyes
- CTAS 2 to the hospital to have IOP reduced

Table 3: Differential diagnosis of ocular pain.

Eye diseases	Characteristic of pain	Visual impairment	Associated symptoms	Signs	Underlying cause / precipitating factor
Corneal abrasion	Sharp and severe	-	Tearing, photophobia	Fluorescein stain +ve	Injury, foreign body, contact lens, trichiasis, entropion
Acute angle-closure glaucoma	Dull and severe	+	Nausea, vomiting, headache, seeing halos	Ciliary flush, semi-dilated pupil	Dilating eyedrop, anti-cold medication
Scleritis	Dull, mild	-	-	Redness*	Connective disease
Uveitis	Dull, mild	+/-	Photophobia, floaters	Ciliary flush*, hypopyon*	Connective tissue disease
Infective keratitis	Dull, mild to severe	+	Photophobia	Whitish lesion(s) on cornea, redness	Contact lens, ocular injury
Endophthalmitis	Dull, mild to severe	+	-	Redness, hypopyon*	Ocular surgery, ocular injury, sepsis

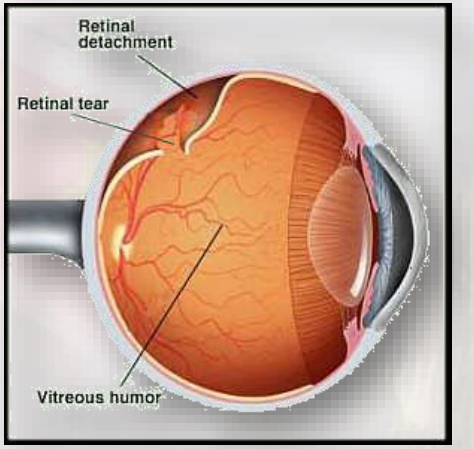
** May be absent*

Central Retinal Artery Occlusion

- Sudden, Painless loss of monocular vision is the usual presenting symptom of retinal artery occlusion (RAO).
- stroke may lead to embolism of the retinal artery
  - May cause loss of only a section of the visual field
  - RAO represents an ophthalmologic emergency, and delay in treatment may result in permanent loss of vision

Retinal Detachment

- a time-critical eye emergency
- separation of the inner layers of the retina from the underlying retinal pigment epithelium
- may be associated with
  - congenital malformations, metabolic disorders, trauma, previous ocular surgery, vascular disease, choroidal tumors, high myopia or vitreous disease, or degeneration



Retinal Detachment

Symptoms

- sensation of a flashing light (**photopsia**) – early symptom
- shadow in the peripheral visual field – may affect the entire visual field within days
- Vision loss may be filmy, cloudy, irregular, or **curtain-like**
- wavy distortion of objects
- sudden onset of one large floater
- shower of black spots
  - onset of floaters associated with flashing lights indicates a retinal tear until proven otherwise

Assessment

- Vision loss – look for improvement with blinking or flushing; could indicate injury to the globe or optic nerve
- Double vision – could indicate injury involving the muscles or CN associated with eye movement
- Severe eye pain – always consider a significant eye injury
- Visible redness, swelling, trauma
- Pupils – equality, size, reactivity

Assessment

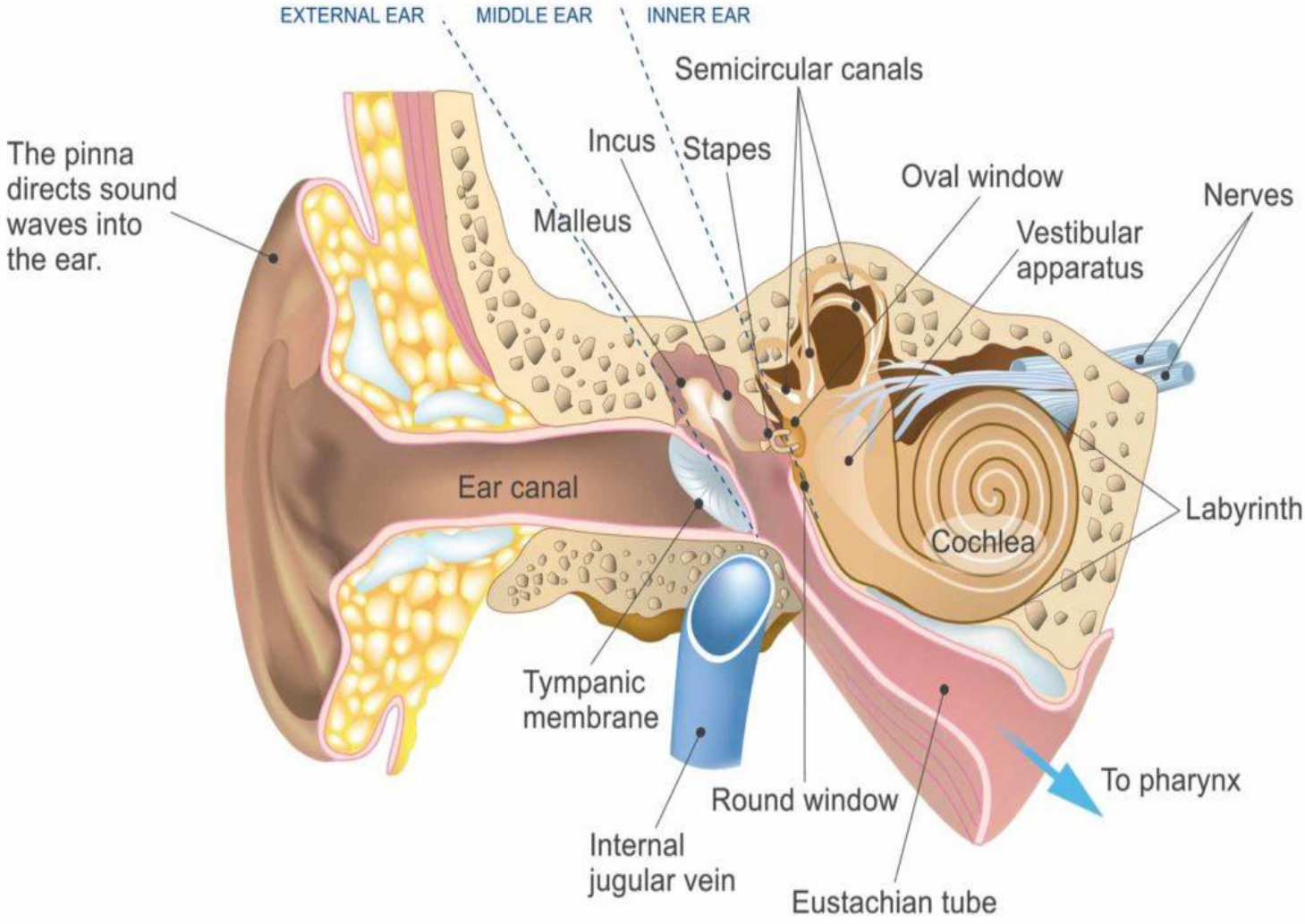
- Physical exam:
  - orbital rim;
  - Eyelids,
  - Sclera
  - Corneas,
  - conjunctivae,
  - globes,
  - pupils (anisocoria?)
  - Eye movement (conjugate/dysconjugate gaze)
  - Visual acuity ***(each eye should be assessed individually)***

Management

- Stabilize any protruding objects as much as possible
- Cover both eyes with rigid covering whenever possible
- Control bleeding and remove large debris (assuming it is not embedded in the socket or globe)
- ***Never exert pressure on the globe***
- If the globe protrudes or is exposed, apply a moist dressing to prevent drying (then a rigid covering)
- Elevate the head (15-30°) and use C-spine precautions if hyphema or ruptured globe is suspected
- Encourage patient not to cough (this may increase IOP)

EARS

Anatomy


EXTERNAL EAR
MIDDLE EAR
INNER EAR
Semicircular canals
The pinna directs sound waves into the ear.
Incus
Stapes
Malleus
Oval window
Nerves
Vestibular apparatus
Ear canal
Labyrinth
Cochlea
Tympanic membrane
To pharynx
Round window
Internal jugular vein
Eustachian tube

Otitis Externa

- infection of the external ear canal (swimmer's ear)
- common problem in most EDs
- Not a common 9-1-1 call
- may lead to serious problems in people who are diabetic or immunocompromised
- common in persons who are swimmers and/or divers or who have other exposures that allow contaminated water to be trapped in the external canal.

Otitis Externa

Presentation

- history of 1-2 days of progressive ear pain
- frequently a history of exposure to water
- Itching
- purulent discharge
- hearing loss
- feeling of fullness or pressure

Otitis Media

- middle ear infection - caused by bacteria or viral URI
- pus & infected fluid accumulate in the middle ear space
- tympanic membrane appears inflamed/protrudes
- Usually begins after the eustachian tube (small tube connecting the back of the nose to the middle ear space) has become swollen, congested, and closed
- commonly in children – especial if they’re febrile

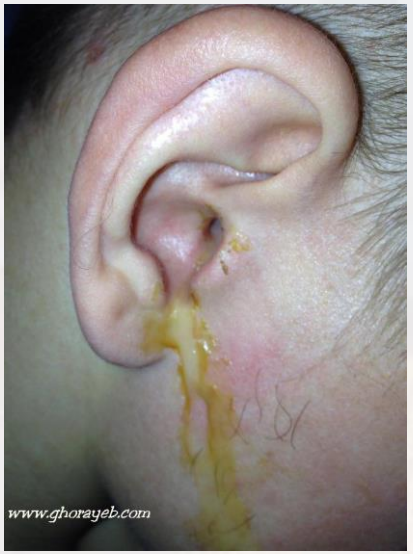
Otitis Media

Presentation

- Earache
- Fever (not required for the diagnosis)
- Accompanying or precedent URI symptoms (very common)
- Decreased hearing

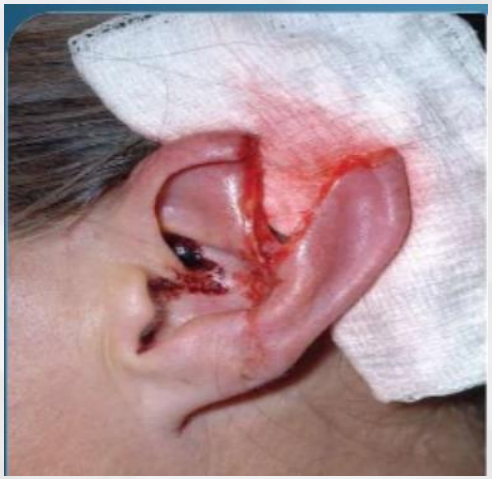
Ruptured Eardrum

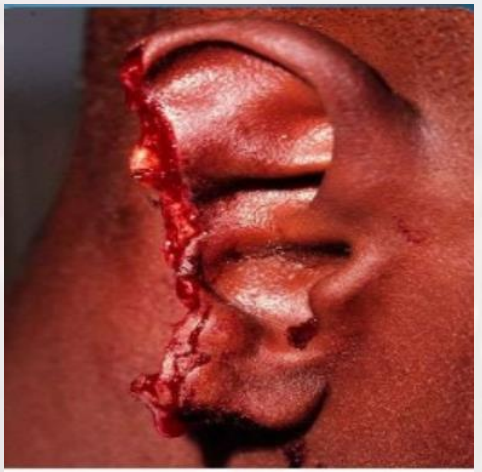
- Result from foreign bodies. Pressure related injuries (environmental/barotrauma, explosions), infections
- Pain ++
- Hearing loss
- Drainage of pus or blood (cause dependent)
  - Cover but allow to continue to drain



Laceration/Avulsed Pinna

- Pad the area between the scalp and the ear
- Control bleeding with pressure as required
- If displaced – attempt to realign as close to anatomical as possible and secure in place (pad with moist then dry dressing)
- If completely avulsed, treat as any other amputated part





Vertigo

- illusion of movement - that you or your environment is moving (“spinning”)
- Is a *symptom* and not a *condition* itself
- Generally not a life-threatening event
- may represent a health hazard, particularly to the elderly
- approximately 20% of all falls that result in hospitalization for serious injuries in the elderly are due to vertigo

Vertigo

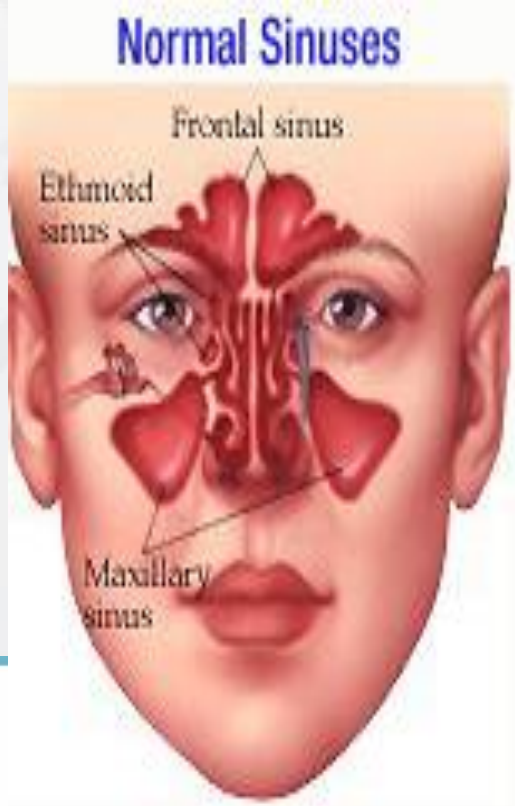
- Differential
  - Benign paroxysmal positional vertigo (BPPV) is the most common - initiated by sudden head movements
  - Labyrinthitis: inflammation within the inner ear- sudden onset of vertigo which may be associated with hearing loss
  - Meniere disease: triad of symptoms: episodes of vertigo, ringing/roaring in the ears, and hearing loss.
  - Acoustic neuroma - tumor causing vertigo
  - Vertigo caused by decreased blood flow to the base of the brain
  - Vertigo is often the presenting symptom in MS.
    - Abrupt onset; inability of the eyes to move past the midline toward the nose
  - Head trauma and neck injury may also result in vertigo
  - Migraine may also cause vertigo.
  - Alcohol/Drug (Rx or other) ingestion

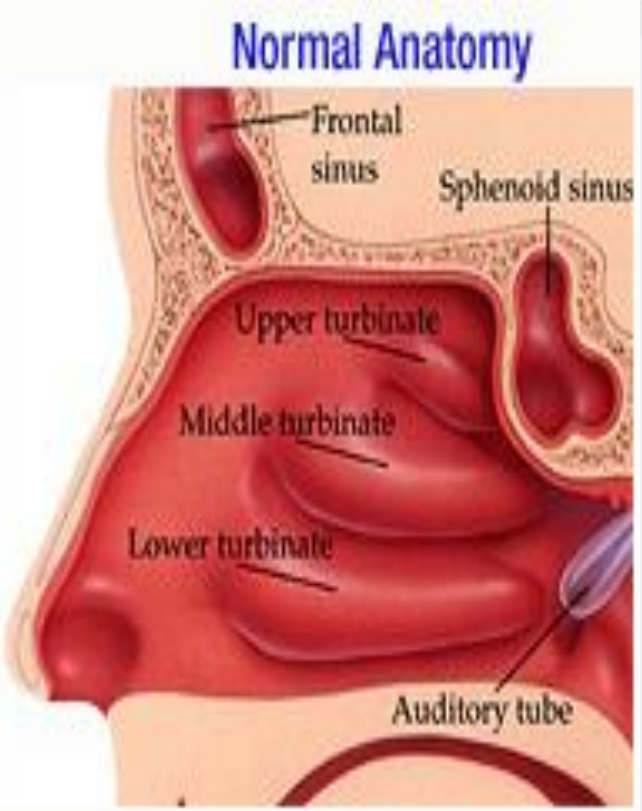
Vertigo Requiring 911

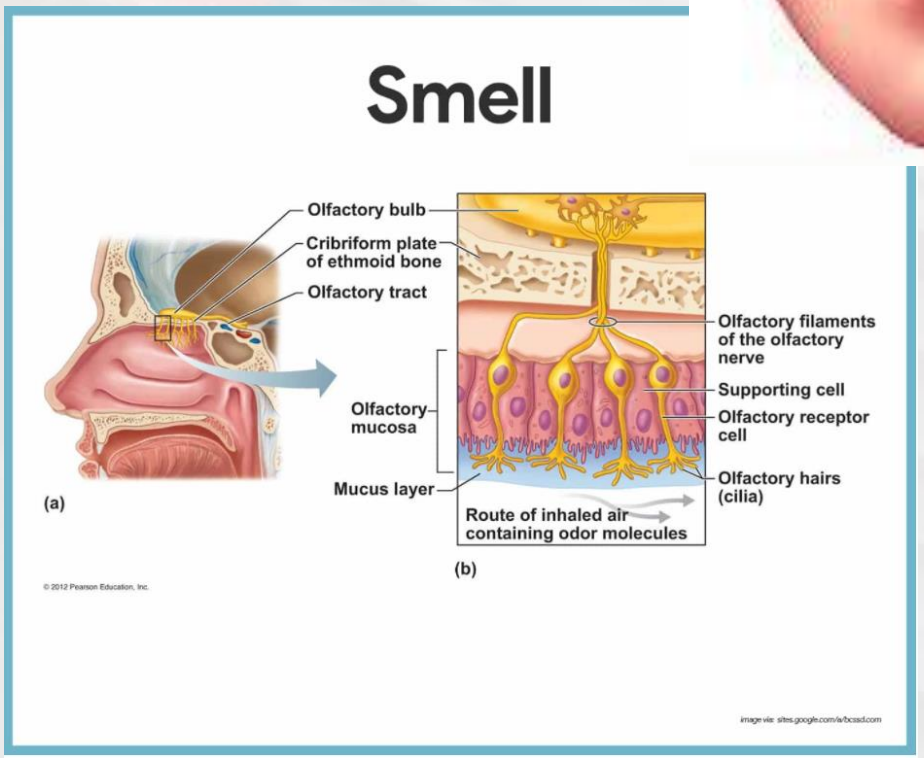
- Sudden onset of symptoms
- Double vision
- Headache
- Weakness
- Difficulty speaking
- Fever
- Abnormal eye movements
- Altered level of consciousness, not acting appropriately, or difficulty arousing
- Difficulty walking, lack of coordination, or weakness of the arms and/or legs

NOSE

Anatomy


Normal Sinuses
Frontal sinus
Ethmoid sinus
Maxillary sinus


Normal Anatomy
Frontal sinus
Sphenoid sinus
Upper turbinate
Middle turbinate
Lower turbinate
Auditory tube


Smell
Olfactory bulb
Cribriform plate of ethmoid bone
Olfactory tract
(a)
Olfactory mucosa
Mucus layer
Olfactory filaments of the olfactory nerve
Supporting cell
Olfactory receptor cell
Olfactory hairs (cilia)
Route of inhaled air containing odor molecules
(b)
© 2012 Pearson Education, Inc.

Epistaxis

- acute hemorrhage from the nostril, nasal cavity, or nasopharynx
- Classified as anterior or posterior
- Hemorrhage is most commonly anterior, originating from the nasal septum
- Most cases of epistaxis do not have an easily identifiable cause

Epistaxis

- Causes:
  - many cases of epistaxis do not have an easily identifiable cause
  - Local trauma (nose picking, blunt trauma)
  - vascular abnormalities
  - oral anticoagulants
  - coagulopathy due to splenomegaly, thrombocytopenia, platelet disorders
  - AIDS-related conditions predispose to epistaxis
  - **hypertensive event/crisis**

Epistaxis - Management

- PPE
- Keep patient sitting with head in neutral position or tilted slightly forward
- Pinch the nose and hold for at least 10 minutes
- Keep patient calm and instruct them to breathe through the mouth
- Provide emesis bag or basin to spit any blood (instruct them not to swallow!)
- Transport
- ***Do not underestimate the potential for hypovolemia with epistaxis!***

Sinusitis

- inflammation/infection of 1 or more paranasal sinuses and occurs with obstruction of the normal drainage mechanism
- Not generally grounds for a 9-1-1 call

FACE & JAW

Dental Injuries

- Fracture / Avulsed Teeth
- Consider more severe injuries (MOI)
- Remove any potential airway obstructions
- Bleeding is likely
- Handle tooth by the crown (do not touch the root if possible)
  - Keep the tooth moist
  - If possible place in a pH balanced solution (egg white, coconut water, cold whole milk, sterile saline -> last resort < 1 hr

Dental Abscess

- localization of pus in the structures that surround the teeth
- Rarely grounds for a 9-1-1 call
- More severe infection
  - Trismus
  - Difficulty swallowing (dysphagia)
  - Respiratory difficulty
- Neck or facial swelling

Trismus

- Spasmodic contraction of the masseter muscle resulting in forceful jaw closure
- Causes:
  - Head trauma
  - Tetanus
  - Rabies
  - Trichinosis (caused by ingestion of larvae from eating certain raw or undercooked meat)
  - Radiation therapy

Impaled Objects

- Airway management - bleeding and C-spine injuries should always be considered
- Stabilize the object in place – Do NOT remove
  - UNLESS!! Airway compromise
  - Control bleeding from inside mouth and outside cheek prn
  - Neck – look for bubbles → use occlusive dressing prn

Summary

- In general, soft tissue injuries to the head can bleed a lot
- Always consider MOI and potential for more serious injuries

QUESTIONS

- Special Senses Anatomy and Physiology - Nurseslabs