Physical Examination of
Head, Neck, Eyes, Ears, Nose, Throat
3 December 2001

I. Head and Neck

GOALS: 1) Review landmarks of head and neck exam
2) Learn to examine thyroid gland

EVIDENCE-BASED LESSON: You can often rule out goiter with thyroid gland inspection.

Anatomy

Skull - 7 bones separated by suture lines

Fontanelles - important during labor and when assessing infants

Anterior - Diamond shape Closes at age 18-24 months
May bulge with crying or increased intracranial pressure, as you might find in meningitis or blockage of cerebrospinal fluid (CSF) flow

Posterior - Triangle shape Closes at age 2 months

Changes from birth process
Molding - cranial bones shift and overlap during trip through birth canal
Resolves within about 1 week
Caput succedaneum - subcutaneous edema, will cross suture lines
Cephalhematoma - subperiosteal blood, so does not cross suture

Neck

Triangles of the neck
Anterior: Bordered by mandibles and sternocleidomastoids (SCM)
Posterior: Bordered by trapezius, SCM, and clavicle

Location of Thyroid cartilage
↓
Cricoid cartilage
↓
Isthmus of thyroid gland

Important landmarks, especially for emergency cricothyroidotomy

Examination of the head

Inspection

Landmarks of face: Palpebral fissures, nasolabial folds
Look for symmetry, size, shape, and involuntary movements
Hair: Growth patterns, lice
Examination of the head, continued

Palpation
Skull: deformity from trauma, muscular tenderness from tension headaches
Temporal arteries: thickening, tenderness, or absent pulse in temporal arteritis
Hair: texture may change in thyroid disease

Examination of the neck

Inspection
Symmetry, goiter, scars

EVIDENCE-BASED LESSON:
Goiter is essentially ruled out if thyroid gland is not visible with neck extension. (JAMA 273; 10: 813-817)

Palpation
Trachea: should be midline, palpate superior to suprasternal notch
Deviation may be sign of a mass or a tension pneumothorax
Downward “tugging” may suggest aortic aneurysm

Lymph nodes: future lecture
Thyroid gland: palpate for size, nodules, and tenderness

Technique
Anterior or posterior approach
Relax neck by using neutral position, also may further relax muscles on one side by tilting toward that side
Use a gentle touch
Have the patient swallow a sip of water while you palpate

CLINICAL SITUATION
You are seeing a patient with a “thyroid problem,” but the chart is lost. What would you look for on history and physical exam?

Hypothyroidism
Symptoms: Cold intolerance, fatigue, constipation, weight gain
Signs: Coarse/dry hair and skin, periorbital puffiness, edema

Hyperthyroidism
Symptoms: Heat intolerance, anxiety, diarrhea, weight loss, palpitations
Signs: Tachycardia, proptosis/eyelid retraction, warm moist skin

Auscultation
Bruit (BROO-ee): audible swishing sound over an artery or vascular organ
Carotid arteries: future lecture
Thyroid gland: may hear bruit over an enlarged, hyperactive gland
II. Ears, Nose, And Throat

GOALS:  
1) Develop a routine for ear, nose, and throat (ENT) exam  
2) Learn physical exam maneuvers to distinguish types of hearing loss  
2) Introduce techniques for use of otoscope, nasal speculum, and sinus transilluminator

EVIDENCE-BASED LESSON:  
History and physical findings that support diagnosis of sinusitis

Anatomy of the ear

External ear: Auricle (or pinna) and external auditory canal (EAC) are cartilage covered with thin, sensitive skin  
Cerumen secreted from distal 1/3 of canal- protects skin

Middle ear: Tympanic membrane (TM) normally looks “pearly gray”  
Pars tensa- inferior 2/3  
Pars flaccida- superior 1/3 (covers the chorda tympani)  
Umbo- where malleus attaches to TM, pulling the TM into a conical shape  
Malleus- manubrium (handle) and short process are visible  
A retracted TM makes the short process prominent  
Light reflex- cone of light that radiates inferior/posterior from the umbo  
Eustachian tube- equalizes middle ear pressure

Examination of the ear- Inspection

External ear

Position: Top of auricle should be above line drawn between outer canthus of eye and occipital protuberance  
Low set auricle may signify chromosomal abnormality

Possible findings

Tophi- deposits of uric acid crystals found in patients with gout  
Chondritis- infection of cartilage- often caused by piercing  
“Cauliflower”-repeated trauma causes cartilage necrosis  
Otitis externa- “swimmer’s ear”, pulling on lobe often painful
Examination of the ear, continued

Middle ear- otoscopic exam

Technique
Use largest speculum that is comfortable
Learn a comfortable hold for the otoscope
Insert otoscope slowly, avoiding bumping the canal-
“Look your way in”
Manipulate auricle (usually superiorly and posteriorly) to see TM
Cerumen removal may be necessary
  - Cerumen spoon- often causes EAC bleeding
  - Irrigation – contraindicated if TM perforation
  - Removal with direct visualization

Pneumatic otoscopy- assesses mobility and compliance of TM
  - Air pressure should move TM- light reflex looks like a sail in wind
  - Effusion (fluid in middle ear) will hamper TM mobility
  - Retraction from eustachian tube dysfunction may allow movement
    only with negative pressure
  - A specially designed speculum allows you to seal EAC more easily

Findings

<table>
<thead>
<tr>
<th>Mobility</th>
<th>Pus in middle ear- otitis media (OM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulging, no mobility</td>
<td>Eustacian tube dysfunction +/- effusion</td>
</tr>
<tr>
<td>Retracted, no mobility</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Infection, crying</td>
</tr>
<tr>
<td>Deep red or blue</td>
<td>Blood (from trauma)</td>
</tr>
<tr>
<td>White flecks, plaques</td>
<td>Healed inflammation</td>
</tr>
</tbody>
</table>

| Bubbles        | Serous fluid                      |

Hearing Evaluation

Screening begins as soon as you meet your patient!

Whispered voice-test each ear separately
Weber test- base of 256/512 Hz tuning fork to vertex
  “In which ear do you hear the sound better?
  Normally, sound is heard equally

Rinne (RINN-e or rin-NAY) test
  Bone conduction (BC)-base of vibrating fork to mastoid;
    then when sound stops, test
  Air conduction (AC)- tines 2cm from EAC
  Normally, remaining time of AC is 2x BC
Examination of the ear, continued

Hearing Evaluation, cont’d

**Conductive hearing loss:** external or middle ear problem

Weber: lateralizes to (heard better in) affected ear
Rinne: BC > AC

**Sensorineural hearing loss:** inner ear problem

Weber: lateralizes to better ear
Rinne: AC > BC

**Equilibrium testing:** if you suspect a vestibular problem causing loss of balance
**Caloric testing:** warm or cold stimulus in EAC should cause horizontal nystagmus (rapid movements of eye right or left followed by slower correction back to the point of focus)

**Direction of nystagmus** is defined as the direction of the rapid portion

Use COWS to remember the normal response:
Cold water in EAC causes nystagmus to Opposite side, while Warm water stimulus causes nystagmus to Same side as the stimulus

Examination of the Nose-Inspection

**External nose-** possible findings
- Deformity- trauma
- Discharge- infection, trauma, foreign body
- Flaring- respiratory distress
- Transverse crease- from “allergic salute”

**Nasal cavity**

**Technique**
May use nasal speculum or largest otoscope speculum
Nasal speculum should open in anterior-posterior direction,
**NOT** pressing on sensitive septum

**Findings**
- Bluish, swollen mucosa- allergies
- Generalized redness- infection
- Bleeding- often from Kiesselbach plexus, on anterior septum
Examination of the Sinuses
Frontal and maxillary sinuses are the most accessible to examination
Palpation and percussion may or may not be helpful
Transillumination of maxillary sinuses:
- Darken room completely
- Patient seated with head back, mouth open and eyes closed
- Light source just lateral to nose and inferior and medial to eye
- Look for light transmitted through sinuses to hard palate
  Lack of transillumination suggests that sinus is filled with secretions
EVIDENCE BASED LESSON:
“Does This Patient Have Sinusitis?” JAMA 270(10): 1242-6
The following increase the likelihood that your patient has sinusitis:
- History of colored nasal discharge
- Poor response to decongestants
- Maxillary tooth pain
- Physical exam showing purulent nasal discharge and abnormal
  maxillary sinus transillumination

Examination of Mouth and Oropharynx

Anatomy
- Oral Cavity:
  - Stensen ducts (parotid glands) open opposite to upper 2\textsuperscript{nd} molars
  - Wharton ducts (submandibular glands) open lateral to frenulum
- Oropharynx: posterior to tonsillar pillars
- Teeth:
  - Eruption of deciduous teeth: rule of 6 (with many exceptions!)
    - 2 at 6 months
    - 6 at 12 months
    - 12 at 18 months
    - 18 at 24 months
  - Permanent teeth start forming at age 6 months

Inspection
- Lips: possible findings:
  - Angular cheilitis (key-LY-tis)
  - Actinic cheilitis: sun damage, may precede cancer
  - Angioedema: allergic swelling
  - Herpes labialis: “cold sore”
- Carcinoma
- Colors:
  - Pale: anemia
  - Blue: cyanosis
  - Red: CO poisoning
Examination of Mouth and Oropharynx, continued
Inspection, continued

Oral cavity
Technique: use tongue blade and/or gloved finger for thorough inspection of buccal mucosa, gums, teeth, and entire oral cavity

Findings
Buccal Mucosa:
Thrush- adherent white patches
Tongue:
Geographic tongue
Smooth – may indicate vitamin deficiency
Glossitis
Black hairy tongue
Varicosities
Nonhealing ulcer or nodule- consider cancer

Oropharynx
Technique
“Say ‘ah’”
“Pant like a dog”- can keep you from having to use the tongue blade
Tongue blade, if needed, is more palatable if moist

Findings
Bifid uvula- may indicate cleft palate
Asymmetric movement of soft palate- lesion of CN IX or X
Erythema, exudate- tonsillitis
Asymmetric tonsillar swelling- peritonsillar abscess
Post-nasal drip

INFANTS - special considerations
Position: parent’s lap or shoulder
Timing: save ear/pharynx exam for last
Ear exam: canal often curves up, so often must pull pinna posterior and inferior, unlike with adult
Pharynx: can often get a good look during crying
III. The Eyes

**GOALS:**
1) Develop a routine for examination of the eye
2) Become familiar with use of ophthalmoscope

**Anatomy**
- **External eye:** Eyelids, lacrimal gland and duct
- **Internal eye:** Light travels through cornea, anterior chamber, pupil, lens, and vitreous body on the way to the retina.
  - Ophthalmoscope can focus at any of these levels

**Examination: Inspection**

**Vision testing**
- Should be done with any visit involving an eye complaint, also used to screen children for visual problems

**Acuity:**
  - Far vision- test at 20 feet with Snellen chart
  - Near vision- test at 14 inches with pocket chart
  - Test without, then with corrective lenses

**Visual fields:**
- Confrontation test estimates peripheral vision (may be important in glaucoma, multiple sclerosis, stroke, or pituitary or other CNS tumor)
- Use your own visual fields as a reference

**External exam**
- Be systematic- for example, move from peripheral to central areas

**Findings:**
- **Eyebrows:** Loss of lateral growth may suggest hypothyroidism
  - Xanthelasma- irregular, slightly raised yellow periorbital lesions may suggest lipid disorder
- **Eyelids:**
  - Ptosis (TOH-sis)- if upper lid covers part of pupil
    - (muscle weakness or neurologic lesion)
  - Ectropion (lid turned out) or Entropion (lid turned in)
  - Hordeolum (stye)- inflammation of sebaceous gland
  - Foreign body- may need to evert lid for full inspection
- **Conjunctiva:**
  - Hemorrhage- from trauma
  - Conjunctivitis- inflammation from infection, allergy…
  - Pterygium (ter-IG-ee-um)- growth of conjunctiva over cornea
External exam of eye, continued

Cornea: Sensation tests cranial nerve V (CN V)
Arcus senilis- lipid deposits, seen in many elderly
Special exam techniques for corneal abrasion

Pupils: Check direct and consensual response to light
May also check accommodation (constrict with near focus)

Miosis (my-OH-sis) if <2mm (narcotic use, elderly)
Mydriasis (mi-DRY-ah-sis) if >6mm (head injury, drugs)
Anisocoria- unequal pupil size, may be normal variation

Sclera: Icterus- yellow discoloration that indicates jaundice

Extraocular eye movements: test CN III, IV, VI and 6 extraocular muscles (EOM)

Technique
Patient watches your finger move through 6 “cardinal positions”

Findings
Lack of coordinated movement
(problem with cranial nerves or muscle strength/alignment)
Nystagmus- involuntary rhythmic eye movements
A few beats of horizontal nystagmus at extreme lateral gaze is normal
Lid lag- exposure of sclera over iris as patient moves eyes inferiorly (found in hyperthyroidism)

Other techniques to assess balance of EOM
Used most often in screening young children
Corneal light reflex
Cover-uncover testing

Ophthalmoscopic exam

Goal: examine optic disc, arteries, veins, and retina

Technique
Allow pupils to dilate
- darken room
- use least light possible from scope (dim, small aperture)
- may consider mydriatic drops (if you do, examine for shallow anterior chamber to avoid acute narrow-angle glaucoma)

Examine patient’s right eye with your right eye and scope in right hand,
patient’s left eye with your left eye and scope in left hand

Keep your other eye open
One hand on patient’s head for proprioception, stabilization
**Ophthalmoscopic exam**, continued

**Technique, continued**

Begin on a mid-high green number (book says 0) for complete exam, dial toward 0 to focus on retina – adjust focus (higher red numbers if nearsighted)
Aim from 15° lateral to patient’s directed gaze to reach optic disc
Trace vessels back to disc
Finally, have patient look at light to examine macula

**Findings**

Papilledema- vague disc margins, suggests increased intracranial pressure (ICP)
Hemorrhages- from diabetes, glaucoma, hypertension
Exudates- many causes
Vessels:
   Arterioles- brighter, redder, narrower (2/3 to 3/5 diameter of venules)
   Venules- more purple, wider

Venous pulsations- normal, but not always present
   If present, rule out increased ICP
   “Nicking” of veins where arteries cross- seen in hypertension

**CLINICAL SITUATION:**

You are performing an ophthalmoscopic exam on a patient with hypertension
What might you find?

Keith-Wagner classification for hypertensive retinopathy

- **Group I:** Increased arteriole light reflex
- **Group II:** Arterial-venous (AV) crossing changes
   - A/V diameter ratio 1 / 2
- **Group III:** Cotton wool spots- yellow areas with poorly defined margins representing retinal infarcts
- **Group IV:** Papilledema- optic disc loses definition from increased intracranial pressure (ICP)