Foundations of Clinical Medicine-1
Physical Exam Framework

The FCM Physical Examination Framework provides basic evidence-based examination techniques. This guide serves as the introduction of basic clinical skills to medical students. This guide covers the following...

- Vital signs
- General appearance
- Head, neck, and eyes
- Cardiovascular
- Respiratory
- Abdominal
- Neurological
- Musculoskeletal (back, upper extremity, lower extremity)
- Skin (basic)

This guide does not cover
- Detailed mental status examination
- Special neurological testing
- Detailed funduscopic examination and detailed assessment of ocular function
- Special musculoskeletal testing
- Pediatric examination techniques
- Breast examination
- Genitourinary examination
- Rectal examination

The 2019 update of this manual focuses on providing the most evidence-based exam techniques based on information from Steven McGee's "Evidence-Based Physical Diagnosis, 4th Edition." All data and tables are taken from this book. Illustrations by Scott Seki, PhD UVA SOM 2020

Initiation of Encounter

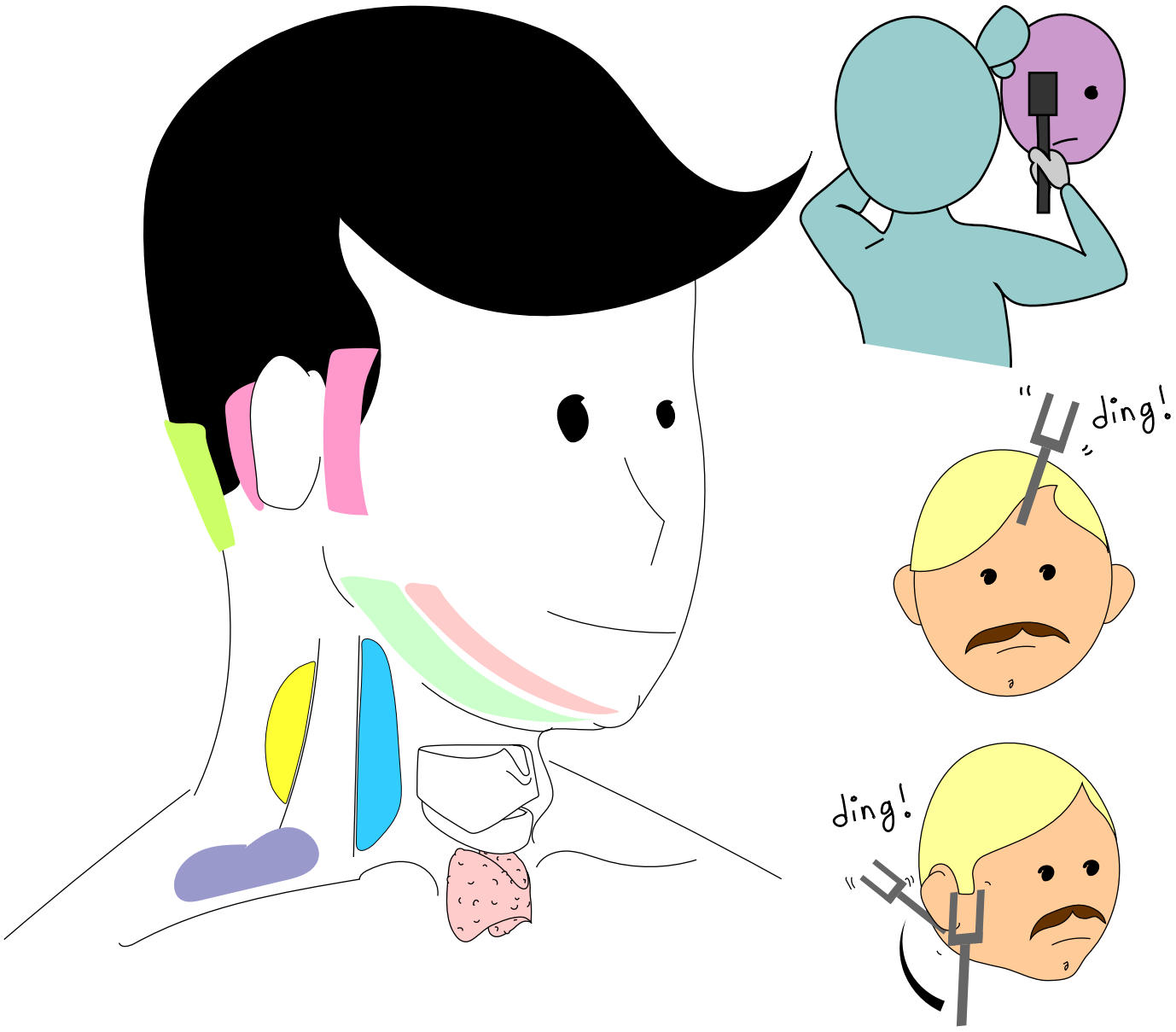
Clinical Courtesy:
1. Wash your hands in view of the Pt
2. If taking notes, do so in a manner that does not interfere with dialogue or rapport
3. Appropriately drape the Pt throughout the physical examination.
4. Verbally demonstrate an awareness and respect for Pt's comfort level throughout the physical examination.

Vital Signs:
5. PULSE: palpate the radial artery (see cardiovascular section) for at least 15 seconds and record findings as a "per minute" rate.
6. RESPIRATION: Stand in front or behind Pt and observe Pt's breathing at rest for at least 15 seconds. Record findings as a "per minute" rate.

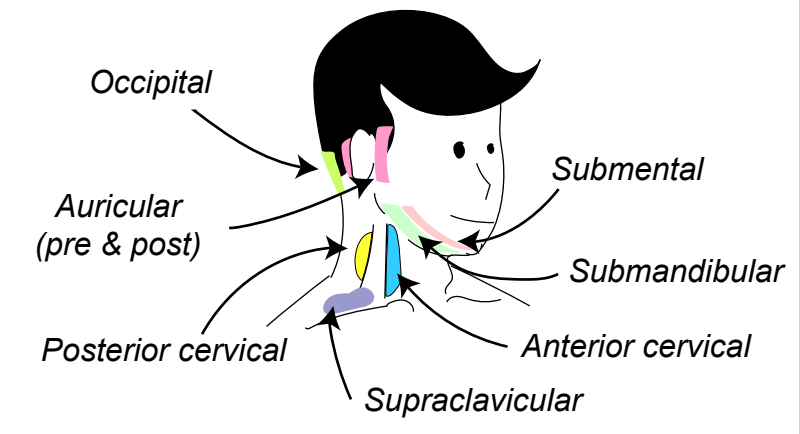
BLOOD PRESSURE:
7. Select appropriately sized cuff, locate the brachial artery by palpation, and place the cuff snugly about the upper arm, centering the bladder over the brachial artery. Arm should be free of clothing
8. Slightly flex Pt's arm and support arm (table, hold arm, etc).
9. Palpate a radial pulse, and pump up blood pressure cuff until radial pulse is no longer palpable, noting the pressure at which the pulse disappears. Then rapidly deflate the cuff. Wait 30 seconds before proceeding. Place stethoscope over the brachial artery, and pump up cuff 20-30 mm Hg above palpable systolic pressure, and then release the cuff slowly, at rate of 2-3 mm Hg per second, listening for Korotkoff sounds. Record blood pressure.

General Appearance:
10. Note the Pt's general appearance (e.g. body habitus, development, nutritional status, cleanliness, level of comfort, emotional state, coherency, degree of physiologic distress, estimated age from appearance versus actual stated age). In addition to this it is critical to notice how your patient is interacting with their environment. Are they shielding their eyes from the light? Do they appear nervous about something or someone in the room? *Quite often, the general appearance of your patient will be one of the most important and revealing of your physical examination findings.*

HEENT

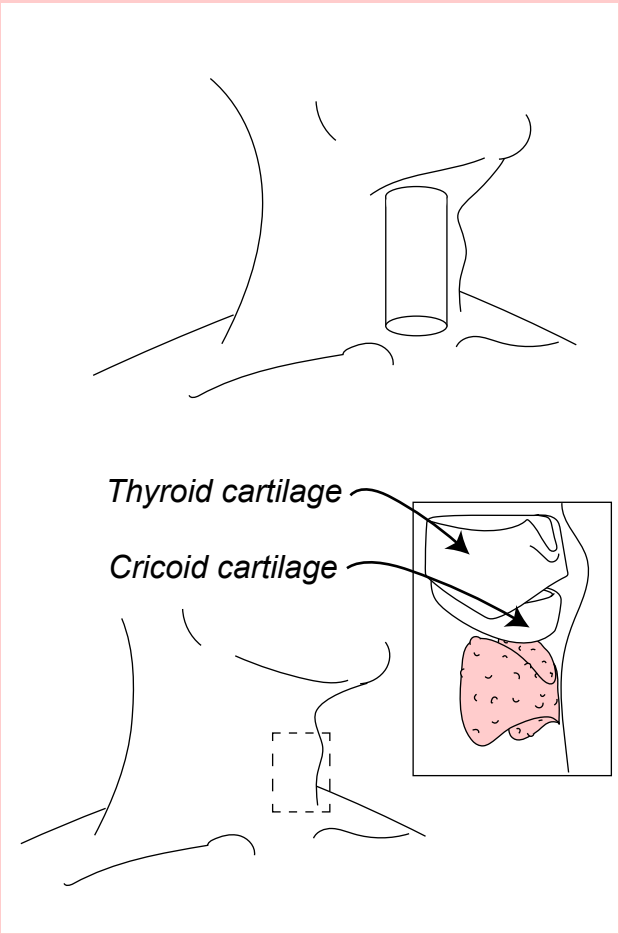


Head and Neck



Lymph Nodes

11. Palpate the occipital nodes
12. Palpate the posterior auricular nodes
13. Palpate the preauricular nodes
14. Palpate the submandibular nodes
15. Palpate the posterior cervical nodes
16. Palpate the anterior cervical nodes
17. Palpate the submental nodes
18. Palpate the supraclavicular nodes.



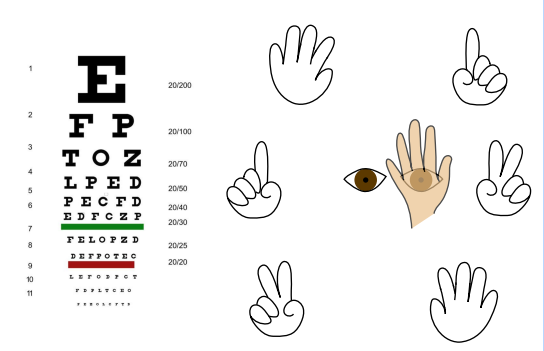
Neck

19. Trachea: Palpate the thyroid and cricoid cartilage with the Pt's neck slightly extended (chin out). Palpate the trachea with one or both hands, noting the consistency of the tissue as well as location (i.e. midline?) and symmetry.

20. Thyroid: Stand behind seated Pt and ask Pt to bend neck back to a neutral position. Locate the cricoid cartilage. Locate the isthmus of the thyroid below it by noting a change in tissue consistency from that of the cartilage. Then ask Pt to swallow (or to take a sip of water) while you palpate the isthmus. Follow the isthmus bilaterally to palpate the two lobes of the gland. Place two fingers of each hand on either side of the trachea. Then displace trachea to the left and ask Pt to swallow while palpating trachea. Repeat displacing trachea to right. The thyroid gland should elevate with swallowing. If it remains fixed, this increases the probability of underlying thyroid cancer by 30-40% (assuming you're truly palpating the thyroid!).

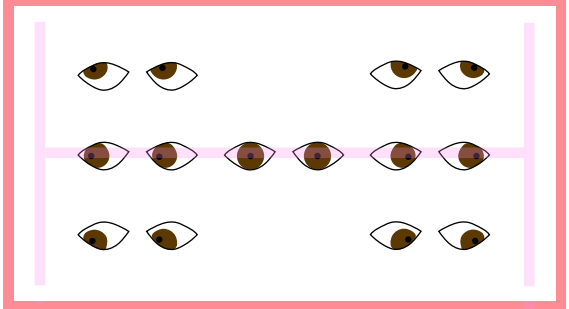
Eyes

Visual acuity and field testing



Left panel: the classic "Snellen Chart" is used to assess for deficiencies in visual acuity. Right Panel: Visual field testing by confrontation.

H-test for extraocular movement



Possible instruction:
"Keep your head still and follow my finger with your eyeballs only"

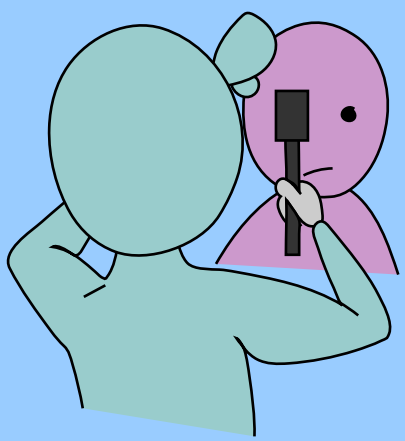
21. *Inspection*
Inspect the eyes (lids, sclera, conjunctiva, irises). Ask Pt to look upward as you gently move the lower lids of each eye downward. In the same way, the Pt should look downward as you gently move the upper lids upward. Cranial Nerve II (visual acuity) is examined in special circumstances.

22. *Visual field testing by confrontation*
Ask Pt to cover one eye with the palm of their hand. Have Pt look directly into your eyes. Test each quadrant of the Pt's visual field by momentarily holding up 1, 2, or 5 fingers. Repeat with the other eye.

23. *Pupil size:*
Inspect the size of both pupils noting symmetry. Check direct and consensual pupillary responses.

24. *Extraocular movement and accommodation*
Position yourself in front of the Pt and request that their eyes follow, without head movement, your finger or a pencil through six cardinal directions of gaze (H test). Evaluate for conjugate eye movements, presence of nystagmus, and/or lid lag. Check for convergence as Pt's gaze follows the object toward the bridge of their nose. Also note pupillary constriction with accommodation.

25. Ophthalmoscopy
With lights off, instruct Pt to look at and focus on a distant point directly in front of them. Place your hand on Pt's forehead to orient yourself. Hold ophthalmoscope in right hand to view Pt's right eye and left hand to view Pt's left eye. Begin from 10"-15" laterally and move in slowly, changing lens strength if necessary in the process, and move to 1"-3" away from the eye until foreheads almost touch. Ask Pt to briefly look into the light at some point during the exam. Examine the retina.



NOTE: ophthalmoscopy technique and findings will be discussed in much greater detail during the FCM ophthalmoscopy session.

Ears, Nose, and Throat

Ears

26. Otoscopy - Gently pull the auricle up and back. Note any disproportionate discomfort as you place traction. While holding the otoscope, slowly insert the speculum with a downward and forward movement into the ear canal. Observe the external canal, cerumen, tympanic membrane, and tympanic membrane landmarks. Repeat with opposite ear.

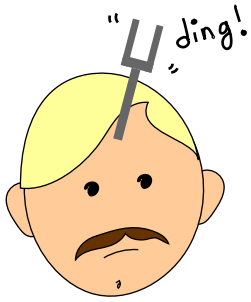
Ears: *The following are tests to determine the etiology of hearing loss using a tuning fork. Technique, as well as normal and abnormal findings and their interpretations are depicted below.*

27. *Weber test*

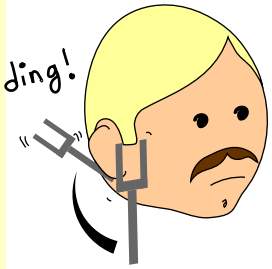
Strike a tuning fork, and place the base of it on top of the Pt's head.

28. *Rinne test*

Strike a tuning fork, and place the base of it on the Pt's mastoid bone. Once the vibration can no longer be heard by the Pt, quickly bring the tuning fork next to the Pt's ear such that the U of the fork faces forward.



Top panel: Weber test
Normally, transmitted sound is heard equally in both ears. If it lateralizes, there is either sensorineural (lateralizes to good ear) or conductive (lateralizes to impaired ear) hearing loss. Diagnose with the aid of Rinne test.



Bottom panel: Rinne test
Normally, air conduction (AC) is greater than bone conduction (BC). If sound is not heard thru AC after detection by BC has ended, then there is conductive hearing loss.

The Weber test is moderately effective at diagnosing the presence of sensorineural hearing loss (~15-20% probability). The Rinne test is very effective at identifying conductive hearing loss (>50% probability with high sensitivity and specificity).

Nares:

29. Position yourself in front of Pt while gently inserting the short wide-tipped speculum into Pt's nostril. Examine the lower portions of the nose and then ask Pt to tilt head slightly backwards. Observe the mucosa for color and presence of lesions.

Mouth and Throat:

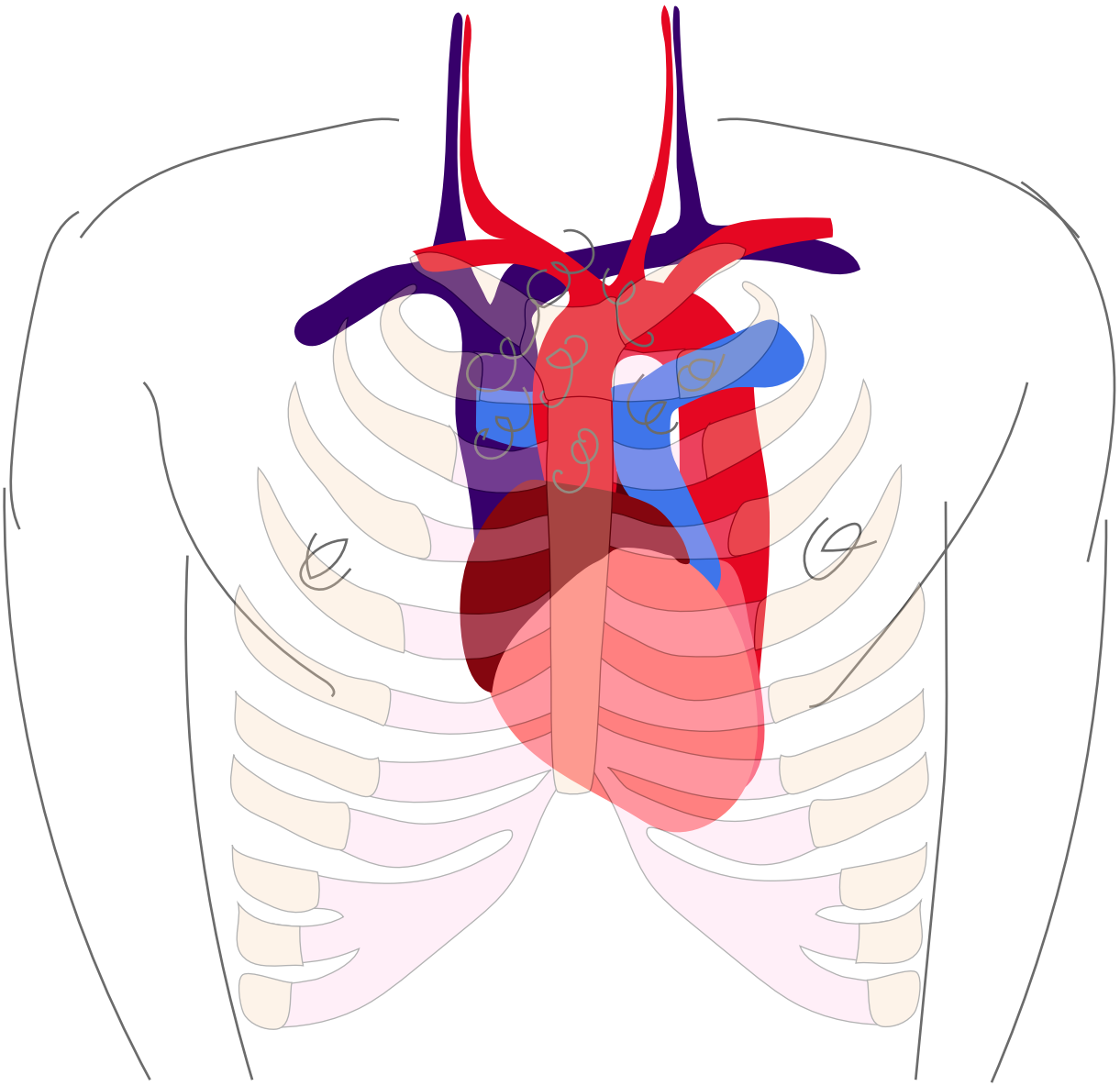
30. Use a light to inspect the mouth (lips, tongue, mucosa, teeth, gums, parotid duct, uvula, pharynx, tonsils, soft & hard palates) for structure, color, moisture, and lesions. Using a tongue depressor, depress more than halfway back on the tongue to observe the posterior oropharynx and surrounding structures. You may have Pt phonate while inspecting the throat.

31. Ask Pt to protrude and elevate tongue for inspection of the floor of the mouth.

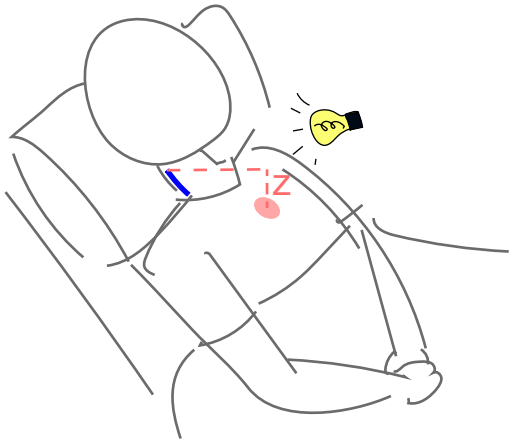
32. Ask Pt to bite down. Inspect the teeth and gums at the same time using a tongue depressor or gloved finger to move the lips and buccal mucosa aside.

Finding	Sensitivity (%)	Specificity (%)	LR if present	LR if absent
Rinne test detecting conductive hearing loss	60-90	95-98	16.8	0.2
Weber test lateralizes to good ear detecting neurosensory loss	58	79	2.7	NS
Weber test lateralizes to bad ear detecting conductive loss	54	92	NS	0.5
Inability to hear ticking watch detecting hearing loss	44	100	105.7	0.6
Unable to hear faint finger rub	98	75	3.9	0.02
Unable to hear strong finger rub	61	100	355.4	0.4
Abnormal whispered voice test	90-99	80-87	6	0.03

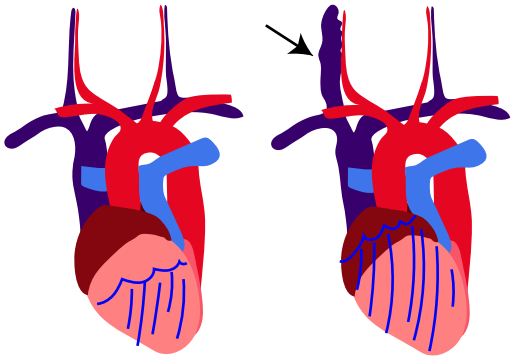
Cardiovascular



Neck Inspection and Auscultation

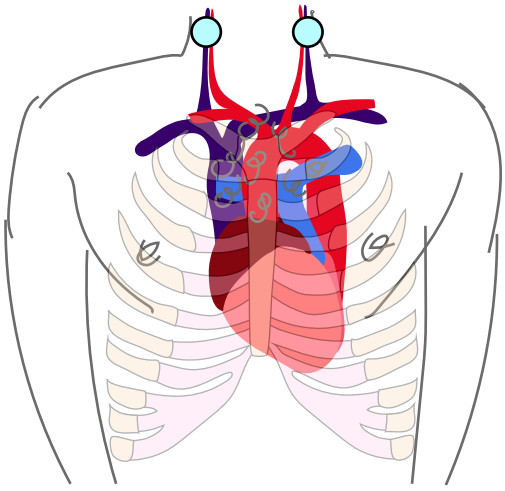


33. Inspection - Jugular venous pulse
Jugular venous pulsations are observed by having the patient recline to 30 degrees from horizontal and shining your pen light over the right side of their neck. Unlike carotid pulsations which have a prominent outward component, JVP has a more prominent relaxation wave.



Normal Elevated RAP

Estimation of Right Atrial Pressure
Note the vertical height (z-plane i.e. out of the patient's chest) to which the column of venous blood in the external/internal jugular veins extends up the patient's neck. Normally, z < 3cm. To convert z to right atrial pressure, add 5 (normal RAP < 8 cm H2O). If visible JVP extends any farther up the neck, this is a sign of underlying cardiac pathology (blood is backing up in the venous system). As an example, individuals with elevated JVP have a 40% increased probability of postoperative myocardial infarction!

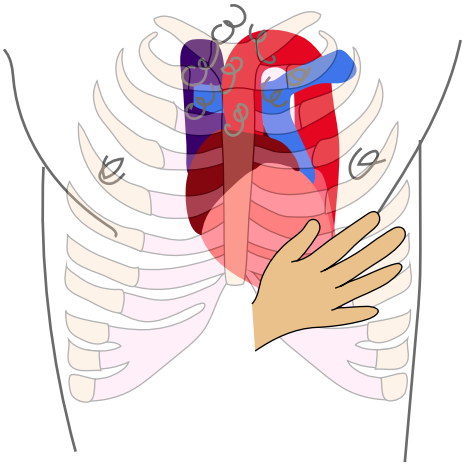


Locations for palpation and auscultation of the carotid artery

34. Carotid Arteries
Palpation
Exert gentle pressure with the pads of fingers on Pt's carotid artery just below the angle of the jaw. This procedure should be repeated on the opposite side and should not be done simultaneously. Common question from the wards: the minimum systolic blood pressure at which a carotid pulse is palpable is 60 mm Hg.

Auscultation
Place the diaphragm or the bell of the stethoscope just lateral to midline (as shown) and have the patient hold their breath. Carotid bruits are murmurs that have a low sensitivity but high specificity for carotid artery stenosis. Identification of a bruit should be followed up with a carotid artery ultrasound as carotid artery stenosis is a risk factor for stroke and would change their future management.

Cardiac Palpation



35. Precordial Inspection
Inspect the precordium for symmetry, scarring, and visual evidence of the PMI (see below)

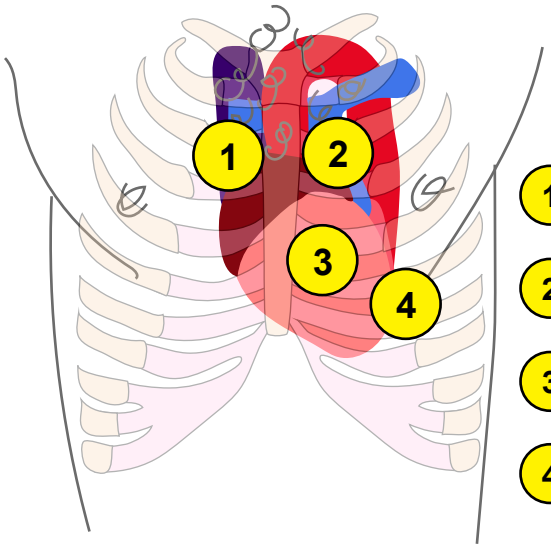
36. Precordial palpation
Use the palmar surface of your fingers to gently palpate the left sternal border and the base while Pt is lying supine. Assess for thrills and heaves (abnormally sustained motions of the chestwall that coincide with the heart beat.

37. Palpation of the point of maximal impulse
With Pt supine, look for any visual evidence of the point of maximal impulse. You may ask Pt to roll to the left to help identify the PMI. If the Pt has significant breast tissue, it may need to be displaced. At times the PMI cannot be palpated even under normal circumstances. When palpable, the PMI should be located at the left 5th intercostal space at the mid clavicular line (MCL). In question stems, you may be presented with a "laterally displaced PMI." In real life, such a finding increases the probability of poor left-heart function by 30-40%.

	Finding	Sensitivity (%)	Specificity (%)	LR if present	LR if absent
Supine apical impulse lateral to MCL	Detecting low ejection fraction	5-66	93-99	10.3	0.7
	Detecting increased left ventricular end diastolic volume	33-34	92-96	5.1	0.7

Ejection Fraction and Heart Failure
The job of the heart is to supply oxygenated blood to the periphery. It has the help of a vascular system that is designed to assist in its pumping aka circulation of blood. In some instances (e.g. heart failure), the heart is unable to efficiently pump. There are many possible causes of this, most of which converge on disruption of the structure of the heart. Heart failure can be thought of in two major ways. In one setting, the heart fills fine, but is too weak to expel an appropriate fraction of the blood that fills it (aka the "ejection fraction" which is normally 55-70%). In the other setting, the heart can pump fine, but it is not distensible enough to fill with an adequate supply of blood to pump forward. These are called heart failure with reduced ejection fraction (HFrEF) and heart failure with preserved ejection fraction (HFpEF) respectively.

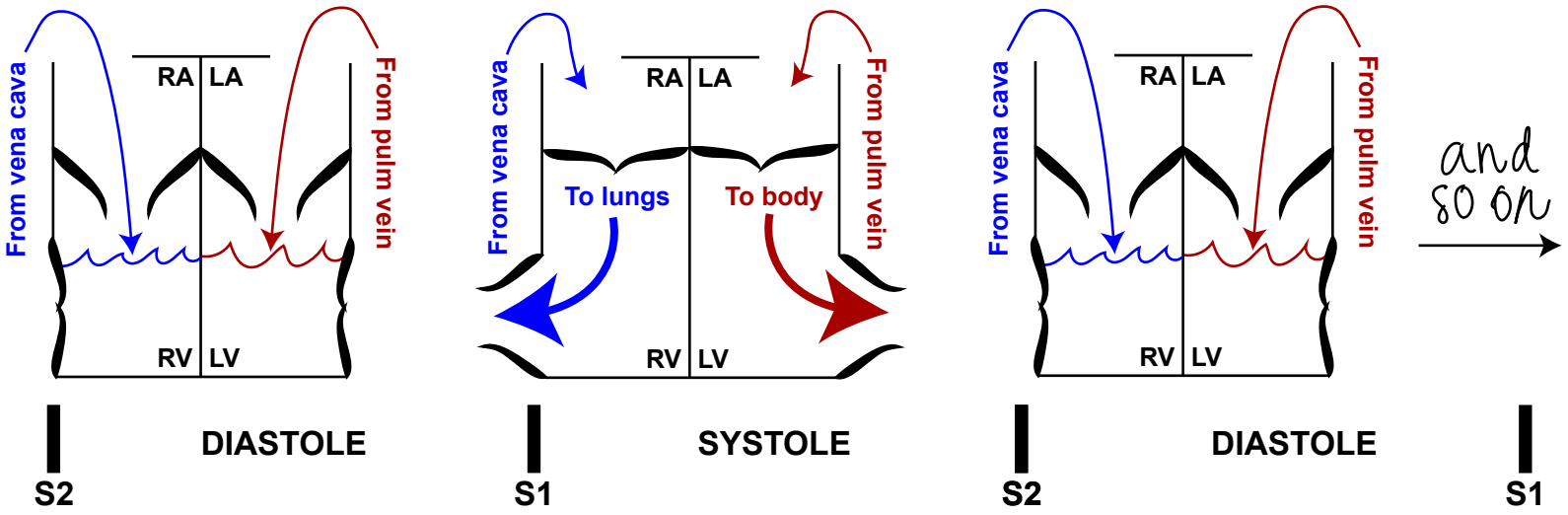
Cardiac Auscultation



1. **Aortic Area**
   Right 2nd intercostal space
2. **Pulmonic Area**
   Left 2nd intercostal space
3. **Tricuspid Area**
   Left 4-5th parasternal border
4. **Mitral Area**
   Left 5th intercostal at midclav line

Patient Positioning
Ideally, auscultation should be performed in the supine, left lateral decubitus, and upright positions. Each position affords certain advantages over the others. Practically, however, this is often difficult to accomplish and is not regularly done

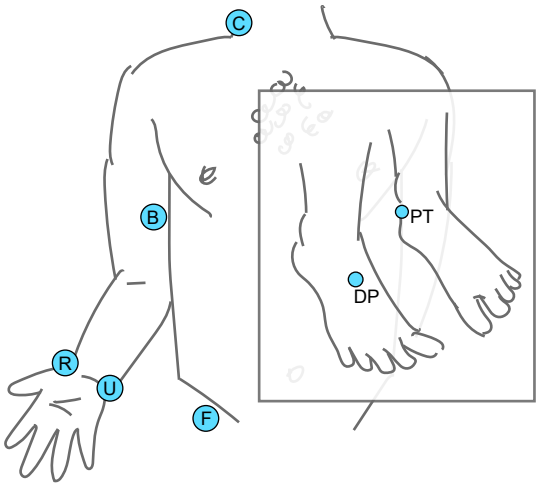
38. Listen to Pt's heart using the diaphragm of the stethoscope. When using the diaphragm, it should be pressed just firmly enough to create an airseal. Evaluate for cardiac murmurs and note location, loudness (1-6/6), quality (harsh, soft, high, or low pitch), radiation pattern, and in which portion of the cardiac cycle the murmur occurs (diastolic vs. systolic). Use the bell of the stethoscope over the PMI to listen for presence of cardiac gallops including S3 and/or S4.



Heart sounds in brief:
S1: closure of the tricuspid and mitral valves due to increased ventricular pressures
S2: closure of the pulmonic and aortic valves as ventricular contraction ceases
Systole: the period between S1 and S2 (blood flow to lungs from RV and to body from LV)
Diastole: the period between S2 and S1 (ventricular filling)
Murmurs: Things that create tubulent blood flow across the valves

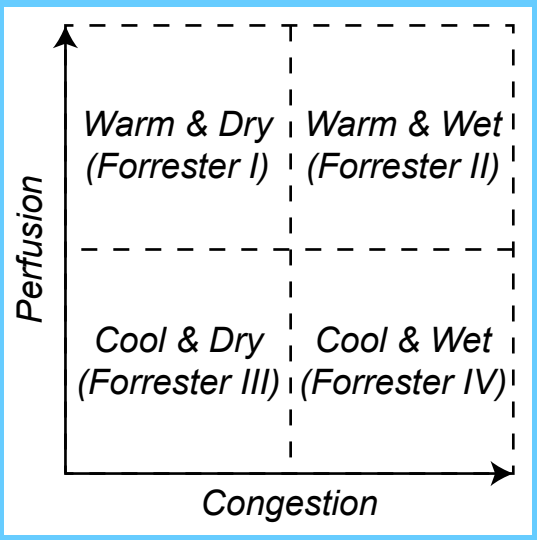
Grading murmur intensity:
1/6 softer than S1/S2; **2/6** same volume as S1/S2; **3/6** louder than S1/S2
4/6 palpable thrill; **5/6** hear with stethoscope just off chest; **6/6** hear without stethoscope

Peripheral Pulses



39. Peripheral pulses
Different pulses are useful in different clinical scenarios. Assessment of an injury to an extremity, for example, will often require you to determine if areas distal to the injury remain "neurovascularly intact." Femoral (F) pulses are routinely checked in the trauma setting as ED personnel are securing the airway and placing IV access in the arms. Absent dorsalis pedis (DP) and posterior tibial (PT) pulses increase the probability of peripheral vascular disease by ~40%. Brachial (B) pulses are often checked in babies.

A word on skin and perfusion
A major component of the cardiac examination is to identify the perfusion status of your patient. Is the vascular network, starting at the heart, supplying adequate blood (i.e. O2) to the body? In acute or chronic limb ischemia, affected extremities will often be pale, cool, and with absent pulses. In hemorrhagic shock, the body will shunt remaining blood toward the places that need it most (brain >> knee) and extremities will feel diffusely cool. In the morning as you examine your patients, one of the most important questions you can answer with your examination is "are they warm, dry, and well perfused?"

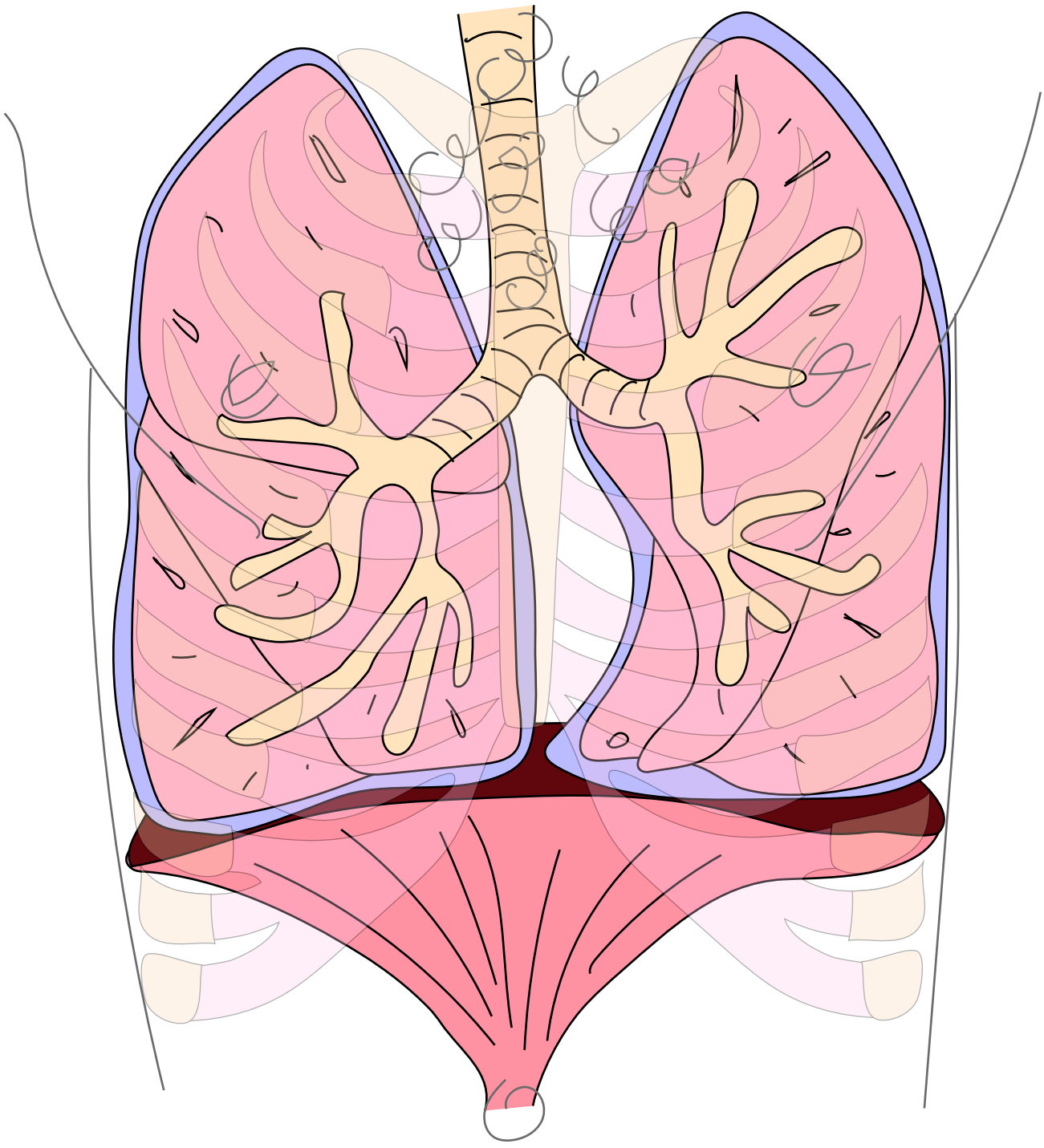


Signs of inadequate perfusion:
Skin mottling, cold extremities, low urine output (<0.5cc/kg/hr classically)

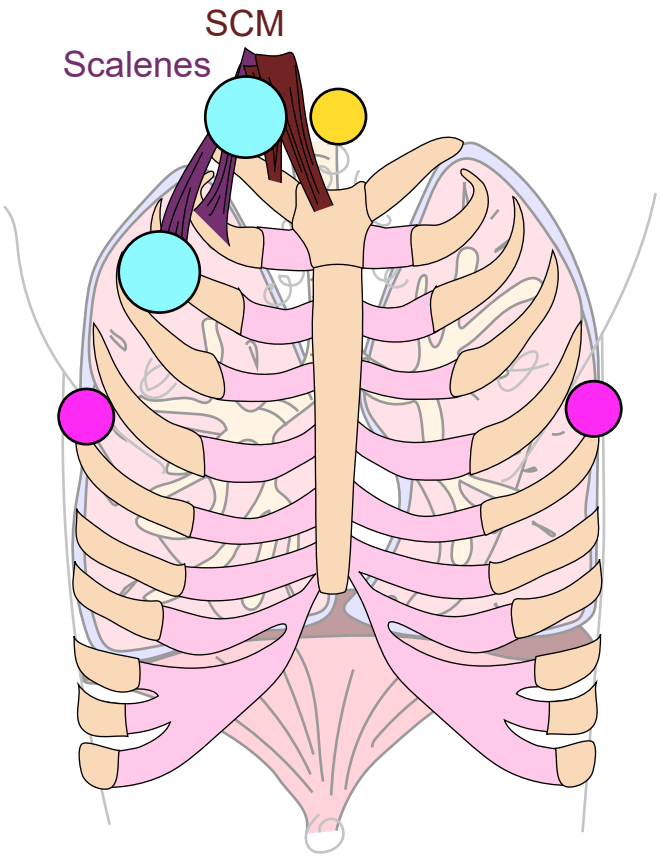
Signs of vascular congestion
JVD, dyspnea, orthopnea, edema, weight gain, BNP elevation, CXR

Forrester Classification for Acute Heart Failure
By now, you have enough physical exam maneuvers to identify whether or not your patient is vascularly congested (i.e. there is a backlog of blood upstream from the heart) and adequately perfusing. Triaging your patients into the Forrester categories, as shown, is important for the following reasons: (i) management strategies differ from Forrester I (well compensated, no intervention necessary) to Forrester IV (offload fluid with diuresis, provide cardiac and vascular support with inotropy and vasoactive medications) and (ii) 30 day mortality increases dramatically from Forrester I to IV. Especially for cardiac patients, it is critical that you look at their neck for JVD, their abdomen for ascites/edema, their dependent areas (feet in most, sacral in recumbent) and also that you put a hand on their knee to determine if it is cool or warm. You can confirm your findings with invasive hemodynamic monitoring and or echocardiogram but this is not always necessary or feasible.

Pulmonary



Inspection



Common location for tracheostomy tubes

Common locations for central venous line placement

Common location for chest tubes (hemo/pneumothorax)

40. Inspection

Contour/Symmetry

With the patient in the seated position, visually look for symmetric chest rise and expansion of the entire chest wall. In addition, pay attention to the neck (especially scalene and sternocleidomastoid muscles) as inspiratory contraction of these are a good indicator of increased work of breathing (discussed below) that can be easily seen in the clothed patient.

Scars

Chest wall scars are informative as to past medical history. Common routes of access to the thoracic cavity are via midline approaches though incisions along the lateral aspect are indicated for many procedures as well (check inferior to the armpit!). Ports for long-term central venous access are often placed in the upper-outer quadrant of the chest. Likewise, you may find evidence of past procedures for breast cancer on the chest wall and axilla.

Discolorations

Findings to pay attention to are any nipple discharge, signs of inflammation, or evidence of trauma. Unlike the abdomen, the thorax is not a common site for self administration of medications.

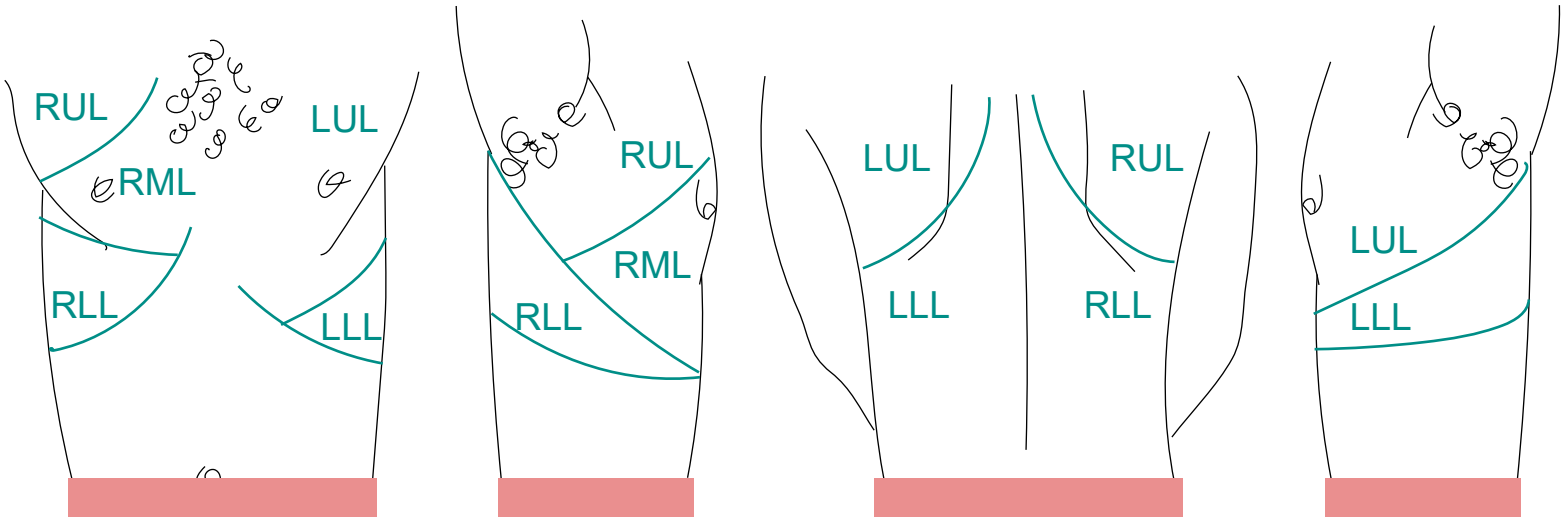
Determining work of breathing

Sometimes, increased work of breathing is noticeable as soon as you walk in the room. Other times, the findings are more subtle. For babies, nasal flaring (an extremely easy physical exam finding to miss) may be the only sign of respiratory disress. On the other hand, paradoxical motion of the abdomen (inward motion during inspiration, outward motion during expiration) may be easy to identify in a baby, but much more difficult in the elderly person with altered mental status. Look at all of the in-holes and their tributaries (nose, mouth, neck, stomach) before declaring your patient comfortable in room air.

A note about supplemental oxygen delivery devices

If your patient is wearing one (e.g. nasal cannula), make a note of both the device and also their current O2 delivery rate (usually there's a meter on the O2 cannister) and ask them if this is their baseline O2 requirement. They may look great on 8 liters per minute (LPM), but usually only require 2 LPM to get around!

Auscultation



41. Auscultation of breath sounds

Listen to the patient's chest using the diaphragm of the stethoscope, which should be pressed firmly onto chest ideally in 4 locations on the back, 4 locations on the front, and 3 laterally. Ask patient to breathe deeply through mouth while you listen. In the recumbent hospitalized patient with limited mobility, it may be more practical to listen on the lateral thorax than to listen anteriorly and posteriorly. Luckily, it is possible to hear all lobes of the lung from this approach.

Breath sounds: select terminology

Vesicular: low frequency "soft and breathy" sounds generated from the lung periphery during respiration. Less audible when there is air (pneumothorax) or fluid (effusion) in the pleural space

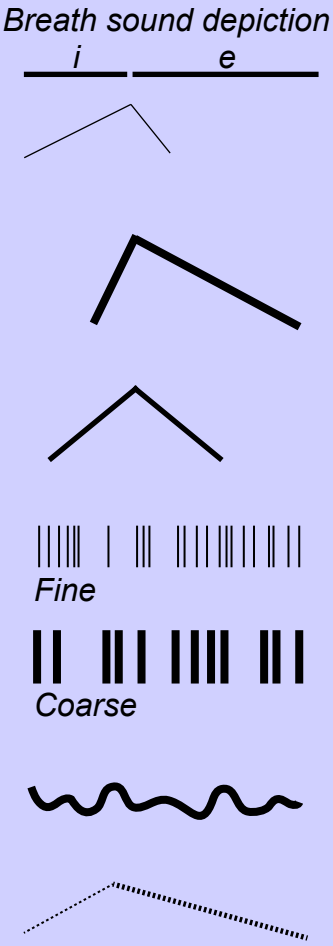
Bronchial: higher frequency "loud, harsh, and tubular" sounds originating from the proximal airways (trachea). When heard in the peripheral lung, indicative of underlying PNA or effusion.

Bronchovesicular: normal continuous sound of respiration heard between 1st and 2nd intercostals anteriorly and between scapulae posteriorly

Crackles: discontinuous sounds associated with PNA, COPD, pulmonary fibrosis, and heart failure. Make sure to have patient clear throat before assessing to distinguish between true crackles (collapsed distal airways reopening) vs. secretions. Also referred to as "rhales." Can be further subcategorized as "fine" (like rice crispies in milk) or "coarse" (more like low pitched discontinuous sound of velcro separating)

Ronchi: Similar to coarse crackles except continuous and gurgly.

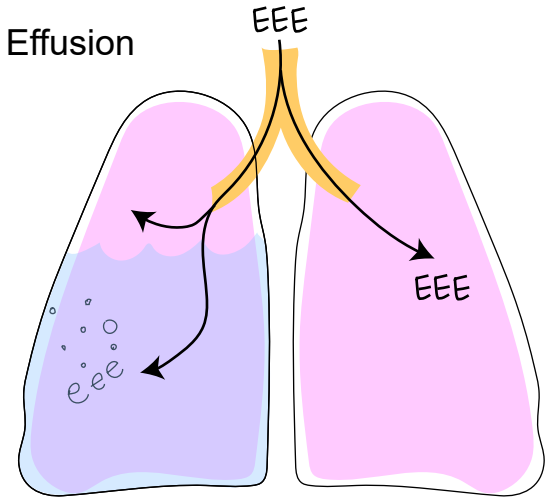
Wheezes: continuous high-pitched sound associated with asthma exacerbations and COPD. Generally expiratory but can also occur during both phases of respiration

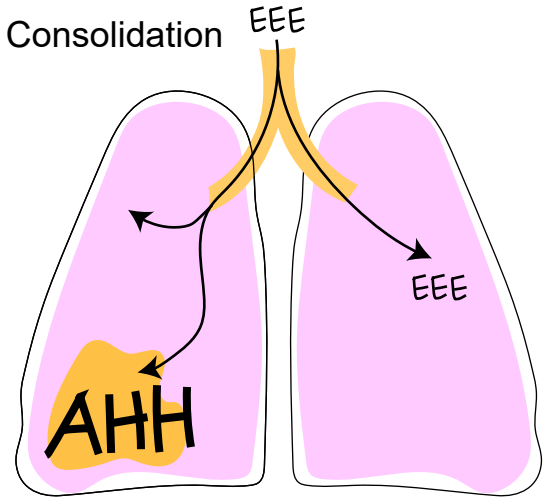


Auscultation cont'd

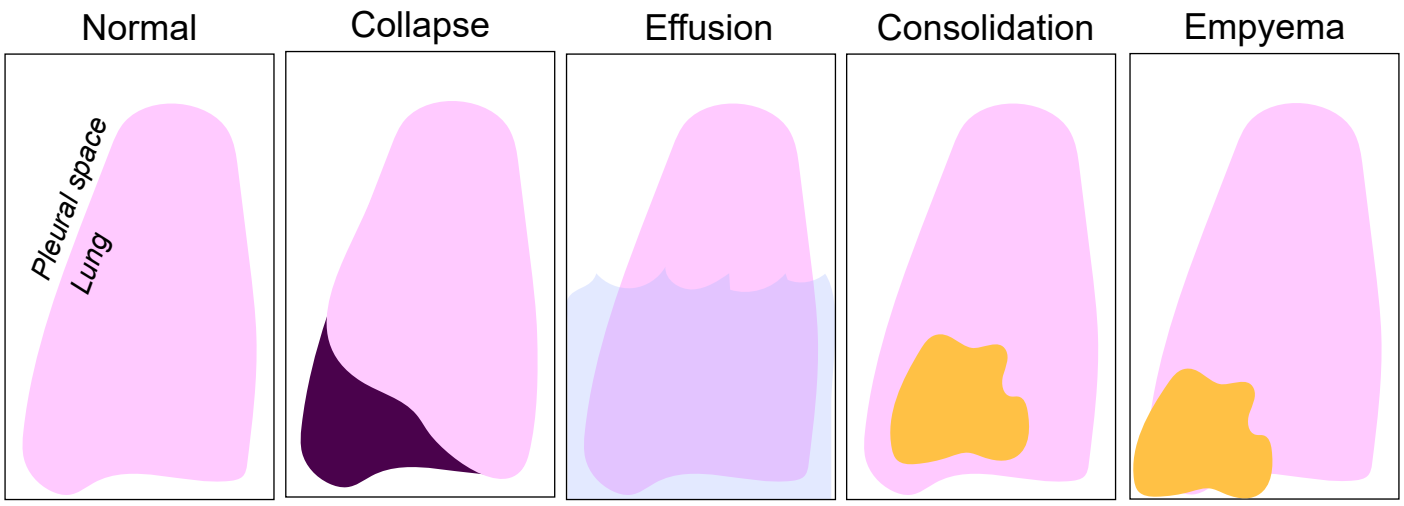
Vocal resonance and egophony
A great deal of information can be learned by placing the stethoscope against the patient's chest/back and having them speak. The transmitted sound is "vocal resonance." The accumulation of certain fluids in the pleural space can act as a filter for vocalized sound, thereby distorting the quality of vocal resonance. Pleural effusions tend to decrease vocal resonance. Egophony refers to the disproportionate amplification of high>low frequency sounds and is often elicited by having a patient say the vowel "EE" and listening for distortion of the vowel to "AA" (variable; as in 'cart' or 'cat'). Diminished vocal resonance increases the probability of underlying pleural effusion by 30-40%. Normal vocal resonance reduces the probability of pleural effusion by 45%. Egophony increases probability of pneumonia in patient with underlying cough and fever by ~20%. Egophony is a highly specific, but not very sensitive finding, and thus its absence is uninformative.

42. Place the diaphragm of your stethoscope over the posterior lung fields and ask your patient to say "EEE." Listen for changes in vocal resonance in transmitted sound and vowel changes indicative of egophony.

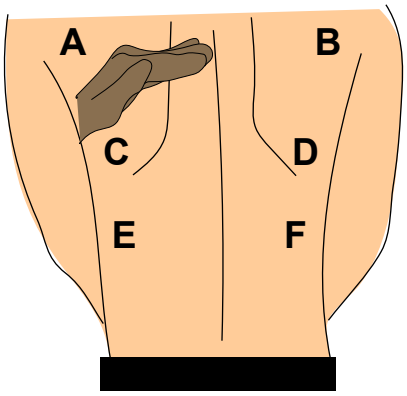




Palpation/Percussion



Underyling conditions that may produce abnormal findings on physical exam



43. Tactile Fremitus

While standing behind patient, place the ulnar surface of your hand on their upper, middle, and lower back (A-F) while having the patient recite the words “toy boat.” Note the transmitted vibrations. Tactile fremitus is most useful as a means of detecting pleural effusion, in which case it will be decreased (think of the effusion as a cushion restricting lung vibration). An area with diminished tactile fremitus (usually bases) has a 30% increased likelihood of underlying effusion whereas absence of such decreases likelihood by 30%.

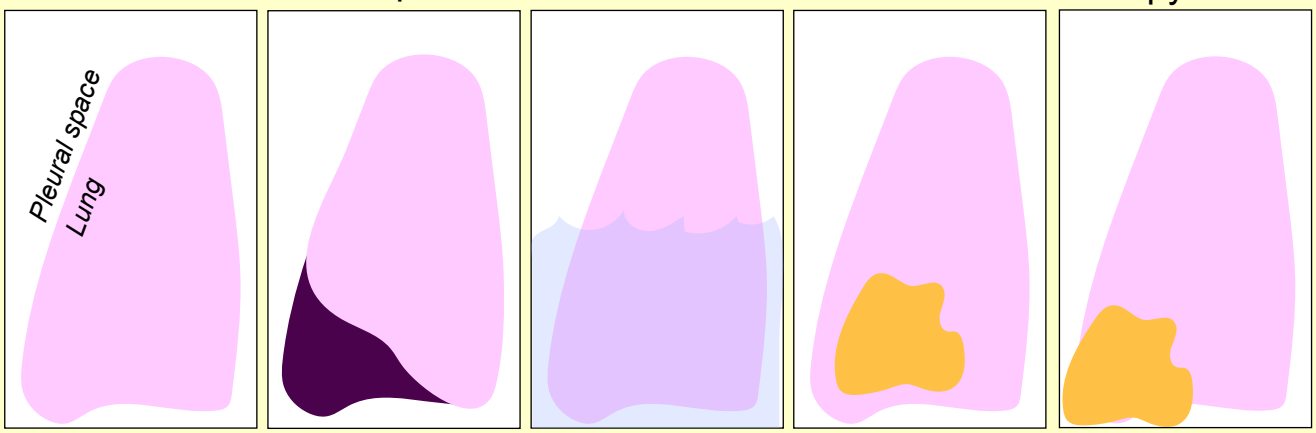
44. Percussion

Place the middle finger of your non-dominant hand on the patient and strike it like a mallet with the middle finger of your dominant hand. Move horizontally from one lung to the other then repeat at 3-4 different levels of anterior and posterior chest. Sounds produced are described as resonant (normal lung), dull (try percussing your knee), or hyperresonant/tympanic (similar to resonant except there is a discernible pitch). Hyperresonance increases probability of chronic underlying air-trapping pathology (i.e. COPD) by ~40% whereas dullness increases probability of detecting any abnormality on x-ray, pneumonic consolidation in a patient with cough+fever, or pleural effusion all by ~20%. Absence of dullness decreases probability of pleural effusion by 45% but is otherwise uninformative.

Diaphragmatic excursion

You may encounter clinical situations where it could be helpful to know where the diaphragm is located and how far it moves during respiration. Despite there being physical exam maneuvers to approximate this “diaphragmatic excursion,” none is sensitive or specific enough for the major underlying pathologies denoted above to be of routine diagnostic utility.

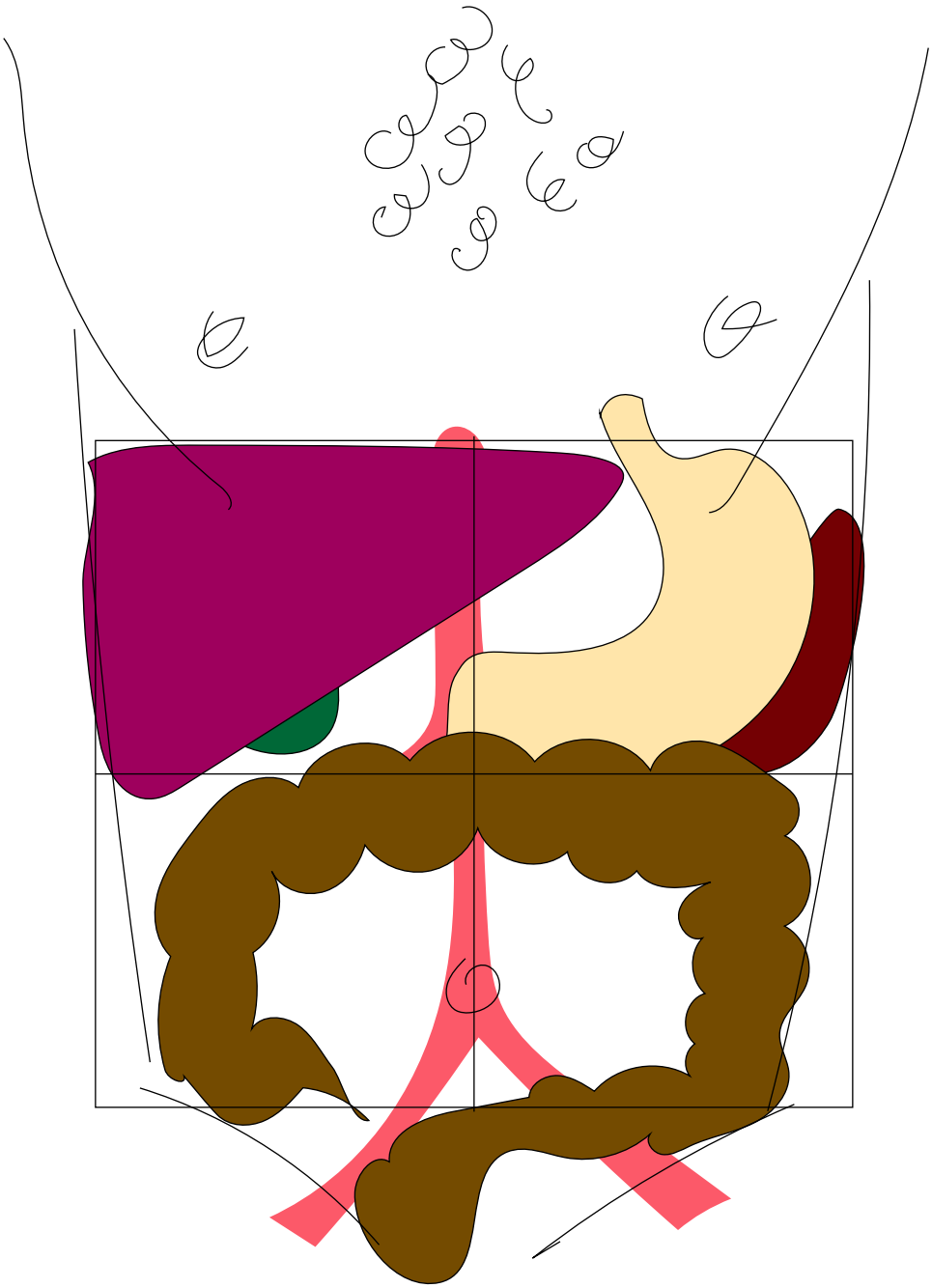
Exam findings for common presentations



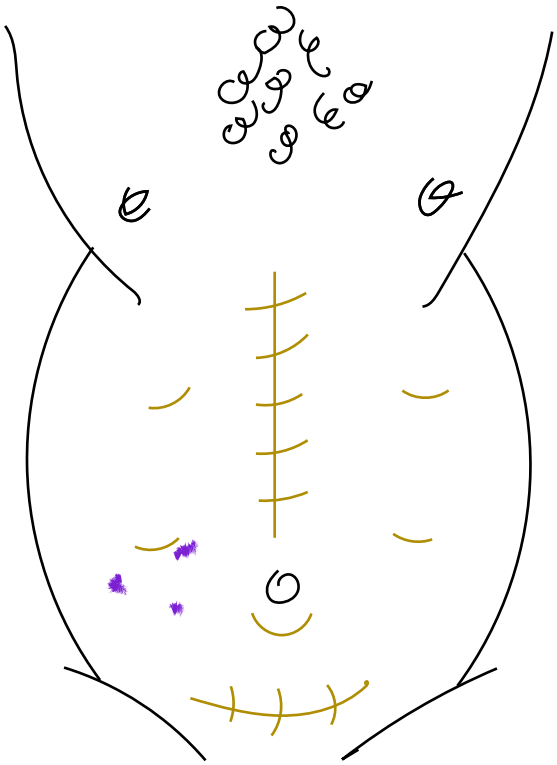
	Normal	Collapse	Effusion	Consolidation	Empyema
Auscultation	Normal	Diminished at bases	Diminished over effusion	Harsh breath sounds, crackles	
Percussion	Normal	Dull over bases	Dull over effusion	Dull over consolidations	Dull over empyema
Egophony	No vowel change		No vowel change	EE to AA	EE to AA
Tactile Fremitus	Symmetric		Asymmetric decrease	Asymmetric increase	

	Exam Finding	Sensitivity (%)	Specificity (%)	LR if present	LR if absent
Detecting PNA in pts with fever and cough	EE to AA	4-16	96-99	4.1	NS
	Percussion dullness	4-26	82-99	3	NS
	Diminished breath sounds	7-49	73-98	2.2	0.8
Detecting pleural effusion	**Asymmetric decrease** in tactile fremitus	82	86	5.7	0.2
	Diminshed breath sounds in hospitalized pt	88	83	5.2	0.1
	Percussion dullness in pt with respiratory complaint	89	81	4.8	0.1

Abdomen



Inspection and Auscultation



45. Inspection

Contour/Symmetry

Abdominal shape can provide key insight into many different disease processes, from starvation to obesity. Also, don't forget about pregnancy.

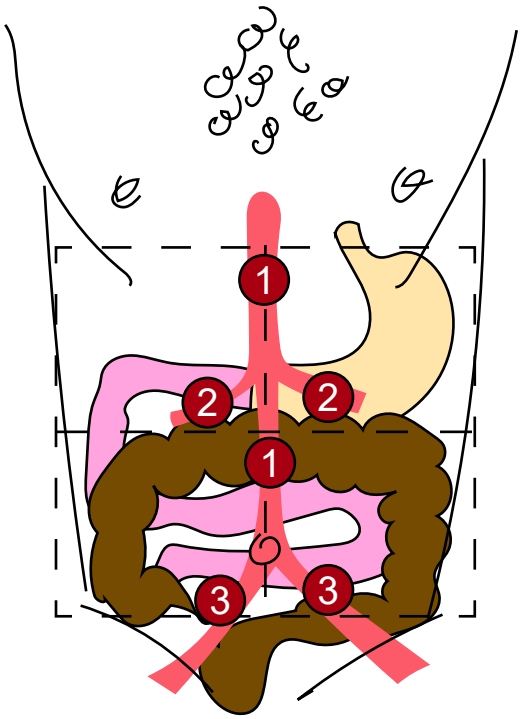
Scars

Abdominal wall scars provide insight into a patient's past surgical history that may aid in understanding their current presentation. Common scars are:

1) Vertical midline (past abdominal surgery)
2) Small incisions from laparoscopic procedures
3) Umbilical
4) "Bikini-line" (C-section, other abdominal)

Discolorations

Discoloration of the abdominal wall may be anything from a benign finding (e.g. injection sites in the RLQ where someone administers their daily insulin or heparin) to indications of a life threatening process.



46. Auscultation of Bowel Sounds

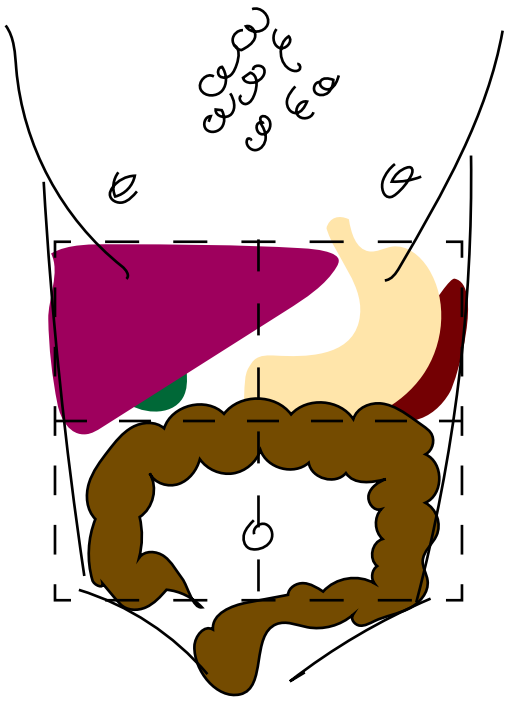
Listen to all four quadrants of the abdomen: RUQ, LUQ, RLQ, LLQ. Note that this does not necessarily help you localize pathology (bowel sounds radiate WIDELY, but it may give some insight into obstructive versus hyperactive processes

47. Vasculature Auscultation

Listen to the (1) aorta; (2) renal arteries; (3) iliac arteries. Disturbances in flow caused by things like atherosclerotic disease may be appreciated as "bruits" - kind of like murmurs for the peripheral vasculature. A bruit anywhere in the abdomen is most likely to be from disturbance in blood flow to the renal vasculature (e.g. atherosclerosis of the renal artery)

General Palpation

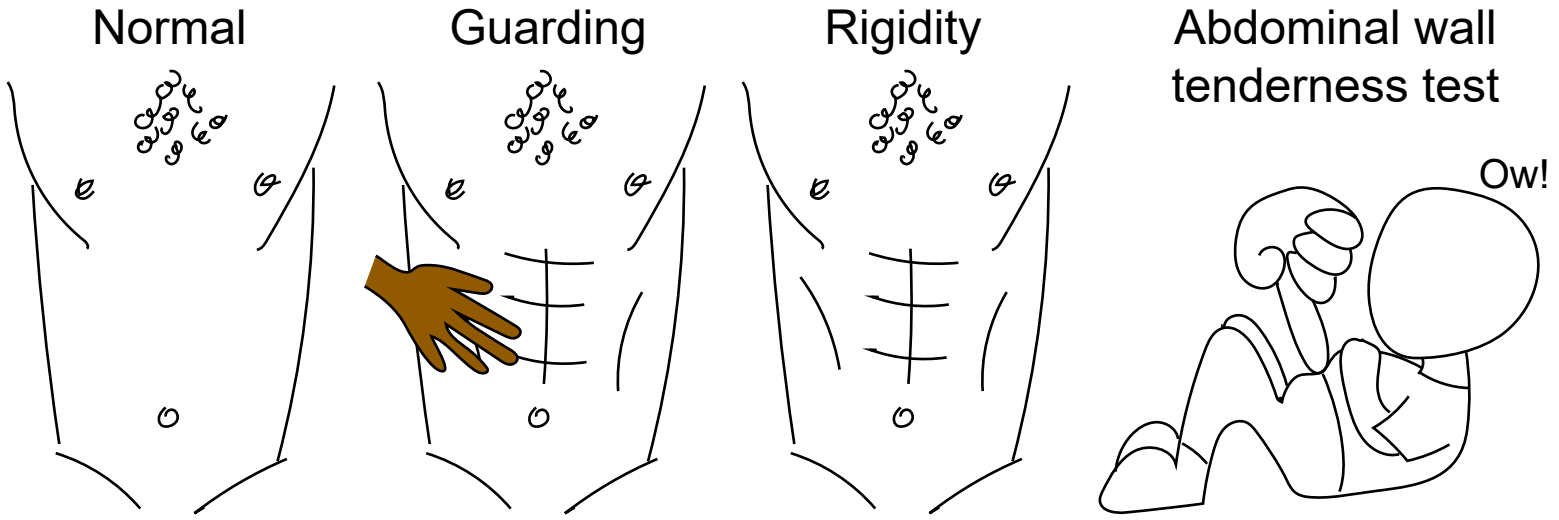
The Normal Abdomen



What you can learn from your exam
The normal abdomen is soft, non-tender, and without palpable masses in all quadrants (unless you're trying hard to find them e.g. liver edge). When palpating, if you elicit tension, pain, or masses, you should be suspicious about pathology in any of the underlying abdominal viscera.

48. Abdominal Wall Palpation
(i) Using the surface of your fingers, gently palpate each of the four quadrants of the abdomen using a rocking motion. If there is a particular quadrant that you suspect to be or are told is painful, save that for last.
(ii) Following shallow palpation, perform deep palpation in each of the four quadrants.

The Acute Abdomen



Identifying the acute abdomen

An acute abdomen is a surgical emergency that with very few exceptions requires an immediate trip to the operating room. The features of the acute abdomen are driven by peritoneal irritation to such triggers as fecal contents or blood that have exploded into the abdominal cavity. Guarding is tensing of the abdominal wall in preparation to be palpated. Rigidity is involuntary contraction of the abdominal wall musculature without exogenous stimulus (you). Rigidity more than guarding should increase suspicion of an acute abdomen. On the other hand, if you palpate an area of tenderness, ask the patient to try to perform a sit-up during palpation, and this increases the pain, the likelihood of an acute abdomen is drastically reduced. The etiology of this pain is more likely to be extraperitoneal. This is the "abdominal wall tenderness test"

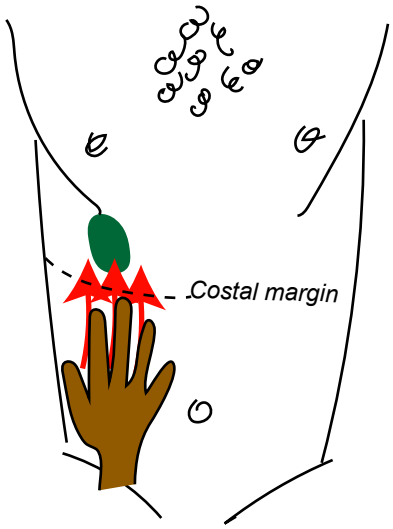
Specific Maneuvers

The Gallbladder

What you can learn from your exam
There is no role for auscultation/percussion in gallbladder evaluation. It is also never normal to actually be able to palpate the gallbladder - the ability to do so is pathognmonic for an insidious obstructive process affecting the bile ducts (though not necessarily malignant in nature). So what can the physical exam tell us about the gallbladder? Most commonly, exam maneuvers targeting the gallbladder are deployed to evaluate for cholecystitis.

49. Palpation: Murphy's Sign:
(i) Place your hand at the right midclavicular line just inferior to the lower border of the ribs.
(ii) Have the patient **inhale slowly** and as they do so, drive your hand firmly but gently inward and upward toward the costal margin.
(iii) If the patient stops inhaling because of pain, this is considered a positive test.

A positive Murphy's sign makes cholecystitis very likely; a negative test does not rule out the condition.

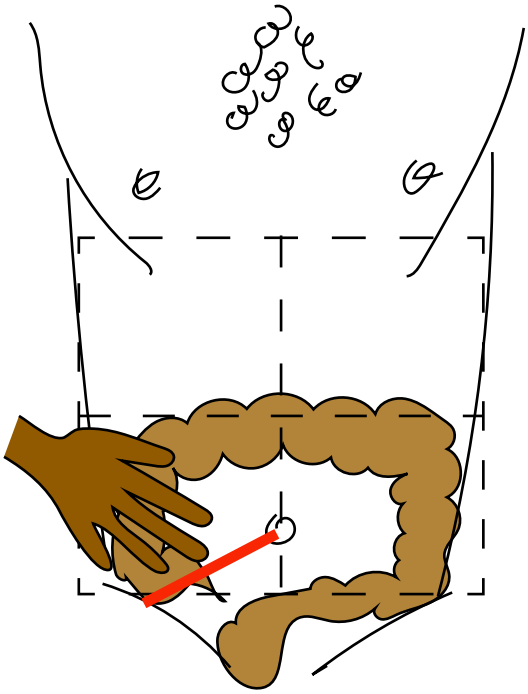


When the patient inhales, their diaphragm will push their liver and gallbladder down into your ascending hand.

Tip: for maximum effect, push IN and UP. Touch their gallbladder, touch their soul.

The Appendix

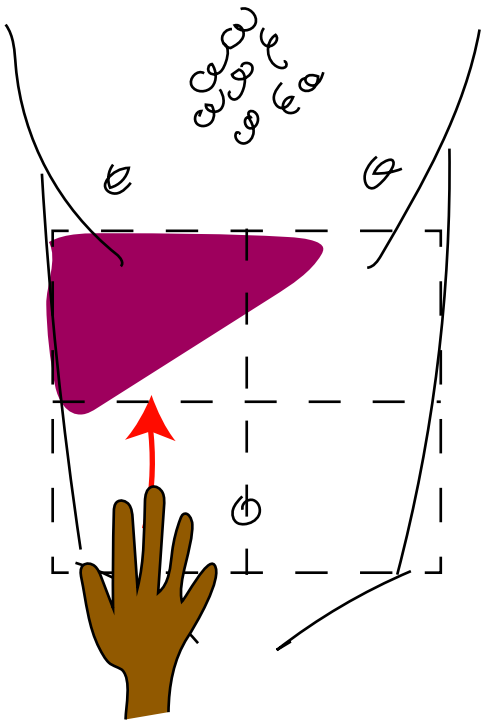
What you can learn from your exam
Diagnosing appendicitis is an important skill for any health care provider. There are many different exam maneuvers to increase/decrease suspicion for appendicitis. We will only discuss those with the highest diagnostic yield tests below.



50. McBurney Point Tenderness
(i) With the patient supine, palpate between the anterior superior spinous process of the ilium and the umbilicus
(ii) A positive test is one that elicits pain
Note: McBurney's point relies on every person having their appendix in the exact same location. This is not always the case. Early on, the pain of appendicitis classically starts peri-umbilical prior to migrating to the RLQ. However, if a patient has no pain anywhere in the RLQ, then it is less likely that they have appendicitis at all.

Specific Maneuvers

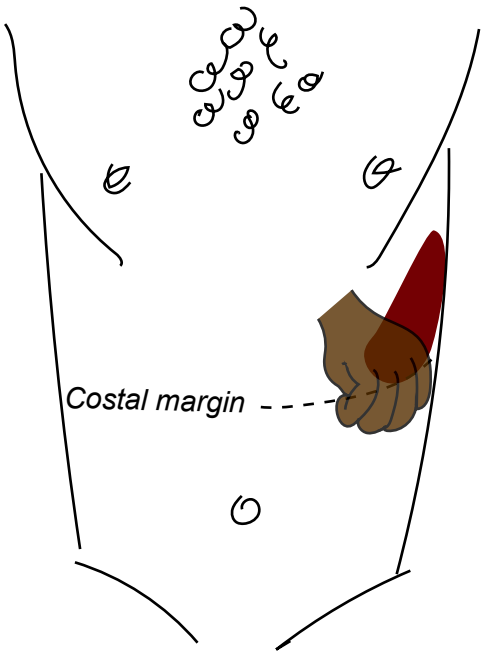
The Liver



What you can learn from your exam
Since the early 1800s, physical exam of the liver has been performed using percussion, auscultation, and palpation, each with varying techniques and goals. Over time, it has become clear that the only two things you can really learn about a liver via the physical exam is (1) where it is (note: not how big it is), and (2) if there are fibrotic/cirrhotic changes...and the best way to learn these things is with palpation, NOT percussion/auscultation

51. Liver Palpation
(i) With the patient breathing comfortably, start with deep palpation at mid-clavicular line in RLQ at level of umbilicus
(ii) Work your way up the abdominal wall 1-2cm at a time
(iii) At some point (usually 5cm below the costal margin), you will feel the liver border hit your fingers on inspiration (downward movement of diaphragm during inspiration pushes liver into your hand)
(iv) As you feel more liver borders throughout your career, you will find that some are harder than others - this is a good clue that there are fibrotic/cirrhotic changes

The Spleen

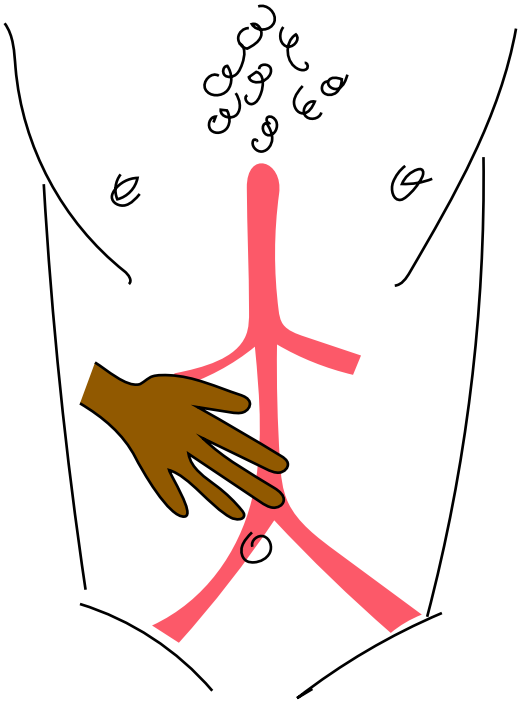


What you can learn from your exam
Splenomegaly can occur due to a variety of conditions. Most commonly, you will see it in the context of infection, malignancy, and hepatocellular disease. The optimal way to identify spleen size is with palpation. There are methods of auscultation and percussion described but the low sensitivities and the specificities of these tests make their use less reliable than simply feeling for a palpable spleen

52. Spleen Palpation:
(i) With the patient in the supine position and you standing on patient right, reach over with your left hand and hook your fingers under the lateral costal margin
(ii) You can either feel for the spleen edge with your left fingers or use your right hand to palpate firmly under the raised costal margin
Note: the finding of a palpable spleen edge is highly suggestive of splenomegaly. In rare cases, the spleen can become massive with the edge as low as the umbilicus.

Specific Maneuvers

Abdominal Aorta

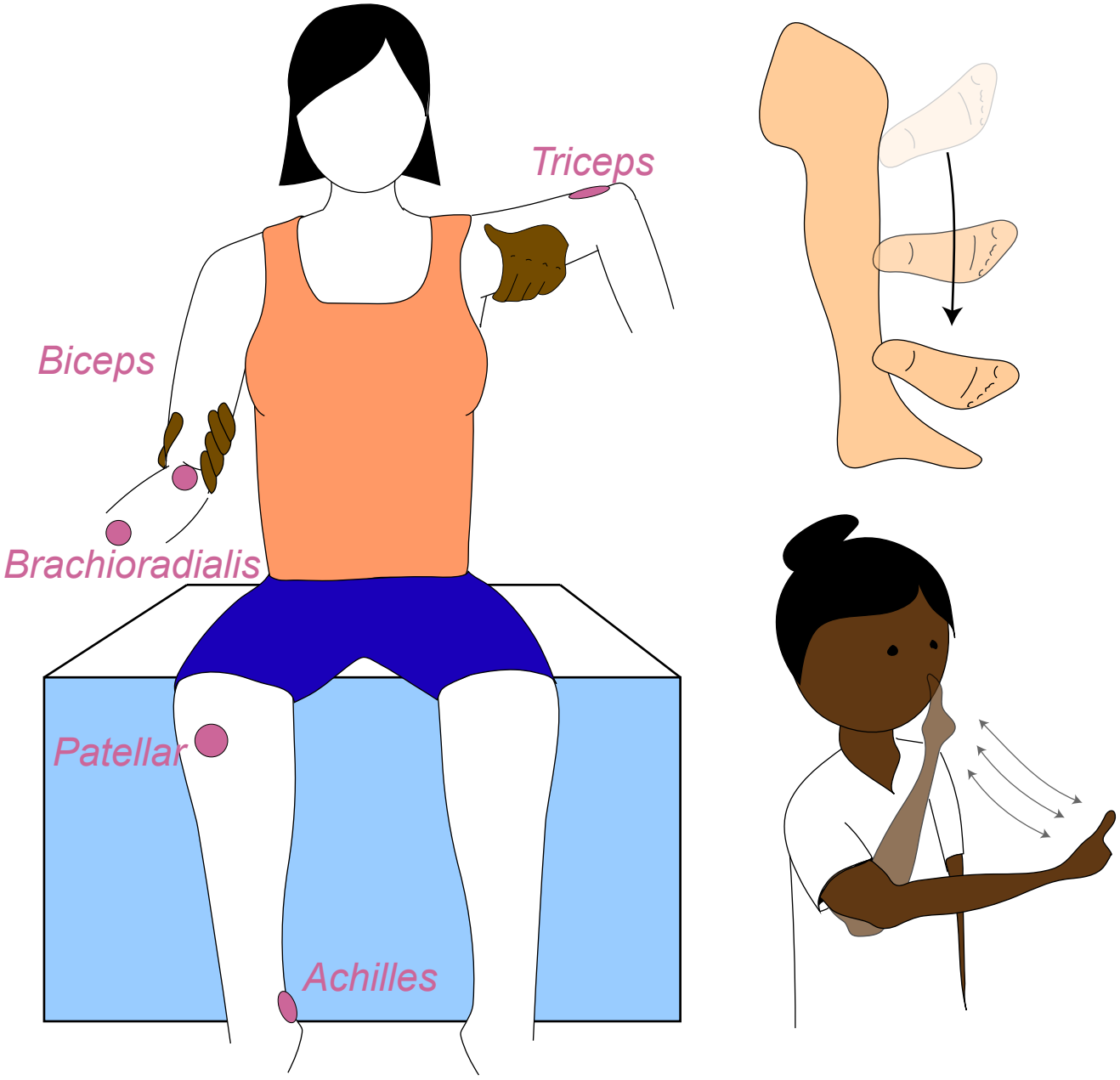


What you can learn from your exam
The abdominal aorta is subject to aneurysmal dilation. When dilated beyond a certain degree, the vascular wall is stretched to such an extent that the risk of rupture becomes unacceptibly high, necessitating operative correction. Ideally, detection of an abdominal aortic aneurysm (AAA) precedes corrective surgery, and physical exam is useful in this regard.

53. Abdominal aorta palpation:
(i) With the patient in the supine position and you standing on patient right, use the palmar surface of fingers to palpate the aortic pulsation located in the upper abdomen slightly to the left of midline
(ii) Once you have found the pulse, place one hand on each side of the aorta and make note of its diameter
(iii) An AAA will classically push the clinician's hands apart, known as "expansile" pulsation. Note that AAAs occur above the level of the umbilicus.

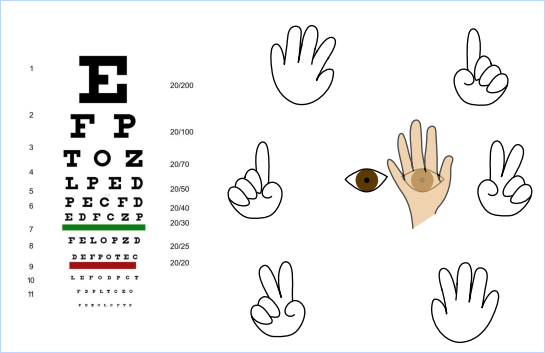
	Finding	Sensitivity (%)	Specificity (%)	LR if present	LR if absent
	Palpable gallbladder detecting obstructed bile ducts in pt with jaundice	31	99	26	0.7
	Palpable gallbladder detecting **malignant** obstruction in pt with obstructive jaundice	26-55	83-90	2.6	0.7
	Murphy sign detecting acute cholecystitis	48-97	48-98	3.2	0.6
	McBurney point tenderness detecting appendicitis	50-94	75-86	3.4	0.4
	Expansile pulsating epigastric mass detecting AAA	22-68	75-99	8	0.6
Detecting peritonitis	Guarding	13-90	40-97	2.3	0.6
	Rigidity	6-66	76-100	3.6	0.8
	Positive abdominal wall tenderness test	1-5	32-72	0.1	NS

Neurological



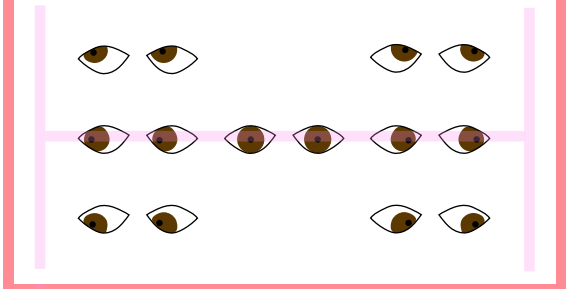
Orientation and Cranial Nerves

CN II: Visual Fields



Left panel: the classic "Snellen Chart" is used to assess for deficiencies in visual acuity. Right Panel: one possible test of peripheral vision. Ask the pt to look straight at you and identify the number of fingers you are holding up in different areas of their peripheral vision (don't be mean and use 2, 3, and 4 fingers). For either test, always assess one eye at a time by having the pt cover their other eye.

H-test for CN III, IV, and VI



Possible instruction:
"Keep your head still and follow my finger with your eyeballs only"

CN V examination

Use your pointer fingers to lightly stroke the forehead, the cheek bone, and the inferior mandible. Aways assess both sides of the face at the same time

Possible line of questioning:
"Do you feel me touching you? Does it feel the same on both sides?"

54. Orientation - Ask Pt questions pertaining to their orientation to person, place, time, and or situation

55. Cranial Nerve I (Olfactory) - Testing of this nerve is not required, but substeances such as coffee grounds may be utilized if indicated in certain clinical circumstances

56. Cranial Nerve II (Visual Acuity) - assess whether CN II is intact by checking pupils and visual fields. When clinically indicated, CN II would be most accurately tested by checking visual acuity in each eye with a Snellen eye chart. A gross assessment of visual acuity can be obtained by having Pt read a phrase or identify an object.

57. Cranial Nerve III, IV, VI (Eye Extraocular Movements) - Position yourself in front of Pt and request that without moving his/her head, Pt's eyes follow your finger or a pencil through six cardinal directions of gaze (lead Pt's gaze in a wide H shape).

58. Cranial Nerve V (Trigeminal) - Examiner should ask Pt to confirm sensation of facial touch in each of the three divisions bilaterally. Pt's eyes should be closed, but this is not necessary.

59. Cranial Nerve VII (Facial) - Assess Pt's facial muscles at rest and then assess symmetry during activation by asking him/her to raise eyebrows, puff out cheeks, and smile

60. Cranial Nerves IX and X (Glossopharyngeal and Vagus) - Ask the Pt to open their mouth and say "AH" to assess for palate symmetry, elevation, and/or uvula deviation

61. Cranial Nerve XII (Hypoglossal) - Ask Pt to skick their tongue out of their mouth and assess for deviation to one side

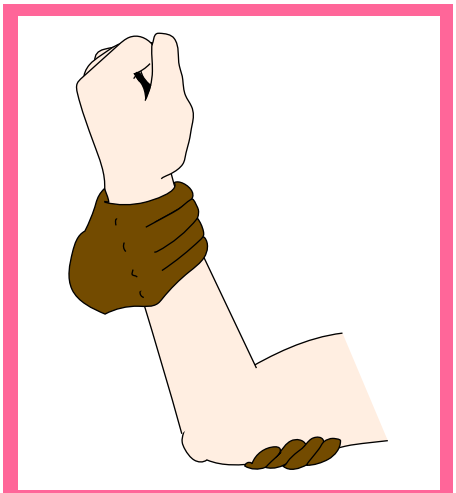
62. Cranial Nerve XI (Spinal Accessory) - Ask Pt to shrug shoulders against your hands

63. Cranial Nerve VIII (Acoustic) - Ask Pt to identify when they begin hear the rubbing of fingers. Begin with fingers approximately 3 feet from the side of PT's head and move in closer until identified.

A note about the cranial nerve exam:
The major time you will be doing cranial nerve assessments in the hospital is when deciding whether or not to triage your patient for immediate intervention for acute presentations of potentially devastating intracranial pathologies, especially stroke. A new abnormal cranial nerve exam almost always warrants an immediate Stroke Alert. Make sure you know (or attempt to ascertain) the patient's "last known normal," anti-coagulation or anti-platelet regimen if any, blood glucose level, and past medical history especially with regard to stroke mimics (e.g. migraine, epilepsy, multiple sclerosis, Lyme disease).

Motor Function

64. Motor Tone: Grasp Pt hand (as if shaking hands) and pronate/supinate the patient's arm, first slowly and gradually increasing in speed. You may also flex and extend their arm at the elbow. Feel for changes in resistance. Pt must not contribute to this movement! To facilitate their relaxation, ask them to perform some other task wih their other hand (open and close fist) to distract them.



How to stabilize a joint

Use one hand to stabilize the extremity just proximal to the joint of interest. Use your other hand to either (i) provide resistance against an instructed move (e.g. "push your arm out against me") or (ii) gently push/pull while asking the patient to resist you (e.g. "dont let me pull you towards me"). The stabilizing hand should be close to the joint whereas the other hand should be farther away to maximize torque.

Concepts to keep in mind for strength testing

Muscle contraction often results in movement at a joint (e.g. flexion, extension) and these are the movements assessed during strength testing. The goal of muscle strength testing is to aid in the diagnosis of causes of weakness. A patient complaining of weakness in their arm may be suffering from a local disorder (e.g. muscle/tendon tear), a more global process (e.g. myopathy), or a neurologic syndrome (e.g. affecting muscles innervated by a specific set of spinal cord neurons) among other things. Most strength testing is performed alternately from one side to the other to facilitate diagnosis of unilateral vs bilateral processes, though in some instances (e.g. grip strength), it is more practical to assess bilateral strength simultaneously.

Assessment of strength:

The standard scale for assessing strength of a muscle group is as follows:

0 = no contraction
1 = flicker or trace voluntary contractions
2 = active movement with gravity eliminated
3 = active movement against gravity
4 = active movement against gravity and moderate resistance
5 = full expected strength

An example description of a muscle strength examination might read, "Patient presents with chief complaint of unilateral weakness in left upper extremity. Physical exam significant for 3/5 strength at the left biceps, but otherwise 5/5 strength throughout."

65-70. Upper extremity strength testing:

65. Assess C5 strength by having Pt abduct arms at the shoulder with elbows bent and fists closed in front of the chest. Push downward on both upper arms to assess bilateral deltoid muscle strength ("dont let me push you down")

66. Assess C5,6 by having Pt flex the elbow to test bilateral biceps muscles (stabilize elbow as shown above)

67. Assess C5-7 by having Pt extend the elbow to test bilateral triceps muscles (same stabilization as biceps assessment)

68. Assess C6-8 by having Pt extend bilateral wrists

69. Assess C8,T1 by having Pt abduct all fingers while you attempt to force their digits together ("spread your fingers and dont let me squish them together")

70. Assess C7-T1 by having Pt tightly grip your fingers

71-74. Lower extremity strength testing

71. Assess L2-4 by having Pt flex bilateral hips (from a sitting position, "lift your leg off of the table")

72. Assess L2-4 by having Pt extend at the knee bilaterally ("kick out against me")

73. Assess L4-S2 by having Pt flex at the knee bilaterally (after Pt kicks out against you, grip their leg behind the ankle and instruct them to "pull me backward")

74. Assess L4-S1 by having Pt both dorsiflex ("toes to the sky") and plantar flex ("press the gas pedals").

Compensation

The large muscle groups of the lower extremity can often compensate for and mask weakness in a particular muscle. Functional tasks (e.g. standing from a seated position) may more reliably identify proximal muscle weakness hidden during routine strength testing (e.g. lifting leg off table against resistance).

Sensory Function

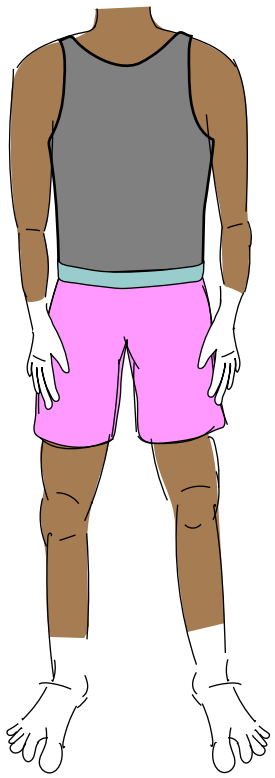
75. Light Touch:
Using your fingertips, assess for bilateral perception in all four extremities by stroking wrists and shins. Pt's eyes should be closed. Sometimes, it is reasonable enough to ask "can you feel me touching you? Does it feel the same on both sides?" Sometimes, you may need to test your Pts further by asking "am I touching you on the right, left, or both?" If you need to get even more sophisticated (some patients cheat), you can even mimic the action without touching them.

76. Pin Prick:
Using the broken end of a swab stick or an unused sharp safety pin, assess for bilateral perception in all four extremities. Pt's eyes should be closed. Leave the dirtiest places (i.e. feet) for last.

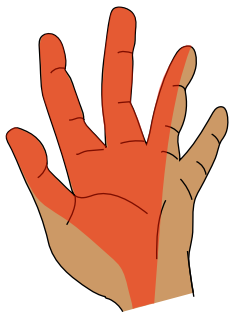
77. Proprioception:
Hold Pt's toe or finger on each side being careful to avoid the plantar/palmar surface. Demonstrate "up" versus "down" to Pt. Have Pt close his/her eyes while you test proprioception. If intact, you may stop. If deficits exists, evaluate more proximally (e.g. ankle/wrist). Note that people without any proprioceptive deficit are wrong 10% of the time with this test (so maybe give your Pt a few tries before sending them to the MRI)!

78. Vibration:
Place a vibrating tuning fork against the bony prominence of Pt's finger or toe and ask Pt to state when the vibration stops. If vibration sense is decreased distally, check vibration sense more proximally (e.g. ankle/wrist).

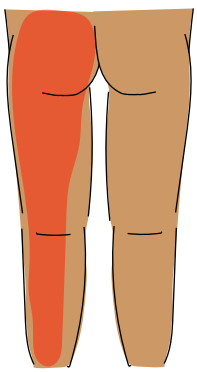
Stocking Glove Neuropathy



Carpal Tunnel

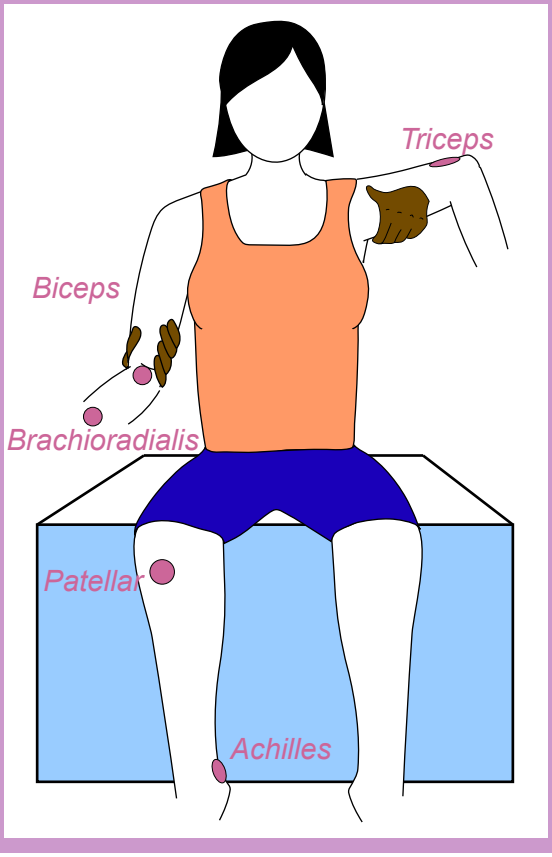


Sciatica



Common Neuropathies
You will see neuropathies in many different forms. They can generally be categorized into those due to to (i) peripheral nerve damage or ischemia (stocking glove), (ii) compression at the nerve root (sciatica) (iii) compression distally (carpal tunnel) (iv) inflammation (trigeminal neuralgia, herpetic neuralgia). In all cases, the distribution of sensory symptoms (think burning, tingling, numbness) will fall into the cutaneous areas served by the affected nerves. It is useful to know the associations of these neuropathies with different disease states (e.g. trigeminal neuralgia in multiple sclerosis or stocking glove neuropathy in advanced diabetes) to guide your physical exam.

Reflexes



79. The Reflex Exam:
Here are some hints to getting a good reflex exam

(1) The patient must be relaxed. In some cases, this is easily accomplished. In others, you may need to position yourself strategically. Shown are some possibile ways to allow your patient's arm to be relaxed as you try to elicit biceps, brachioradialis, and triceps reflexes.

(2) Do not worry about hurting your patient, you (probably) wont (and if you do, they will forgive you in time). If you are too worried about hurting them, you will not hit hard enough to elicit the reflex

(3) For biceps and brachioradialis reflexes, you can place a finger over the tendon to provide some extra stretch and some cushion, thereby facilitating a better reflex response

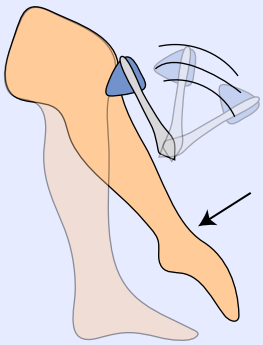
(4) The move is a flick of the wrist - like flicking a handbell

(5) Practice and resist the urge to blame your hammer!

Grading reflexes:
Reflexes are graded on a scale of 0-4. The most clinically useful descriptions are the total absence of a reflex (as can happen in spinal cord injury) or the elicitation of sustained clonus, a reptitive and rhythmic cycle of contraction and relaxation (quantified in number of beats). Other deviations in the normal amplitude of a given reflex (i.e. hypo/hyperreflexia) are not always pathologic and are less clinically informative in isolation.

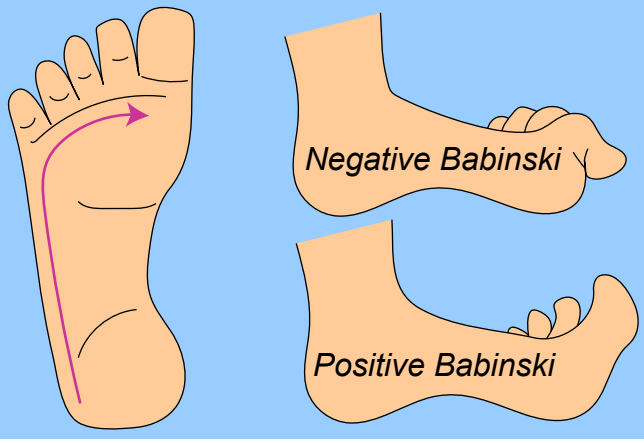
0 = Reflex absent
1+ = Reflex present but weaker than "normal"
2+ = Reflex normal
3+ = Reflex crosses joints
4+ = Elicitation of clonus

An example documentation of reflexes may be as follows: "Pt with known history of ALS presents with new onset left lower extremity weakness (strength 2/5). LLE patellar tendon reflex 4+, otherwise DTRs 2+ throughout."



Joint crossing: *a sign of hyperreflexia defined as the "spreading" of a reflex, leading to contraction of a muscle not currently being tested (e.g. patellar reflex testing eliciting dorsiflexion of the ankle).*

80. Babinski Reflex
Drag a sharp-ish object over the indicated pathway. Except in infants, a positive Babinski (toes up) is indicative of upper motor neuron dysfunction.



Coordination, Gait, and Station

81-82. Tests of Coordination:

81. Finger-Nose-Finger:

Hold out your index finger and as Pt to touch it with their index finger, then touch their nose. Your finger should alter direction and move progressively farther away. Repeat with Pt's other hand. Abnormal findings (e.g. overshoot, intention tremor) are often amplified at the extremes of reach, so make your patient work for it!)

82. Heel-Knee-Shin:

Have Pt place one heel on the opposite knee and slide it down toward the ankle. Repeat with Pt's other foot.

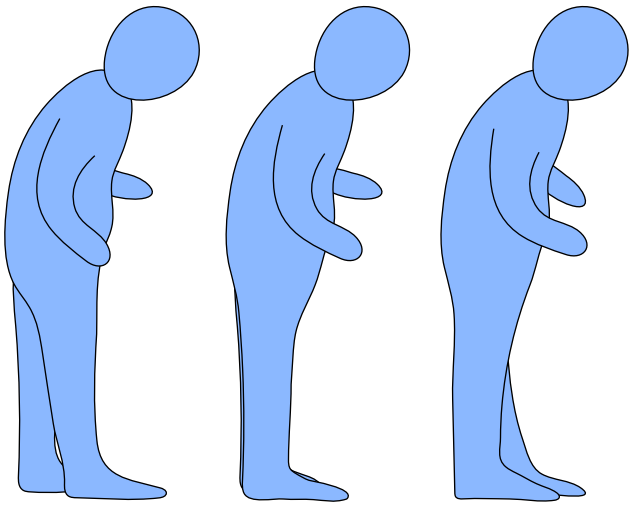
83-84. Tests of Gait and Station:

83. Romberg Sign:

Observe Pt standing with their feet together and eyes closed for up to 60 seconds. Cerebellar, sensory, and vestibular pathology are among the etiologies for a "positive" Romberg (i.e. Pt on the verge of falling, usually within 10 seconds). Make sure you are positioned to stabilize your Pt as indicated to prevent any falls from actually occurring in your clinic.

84. Gait:

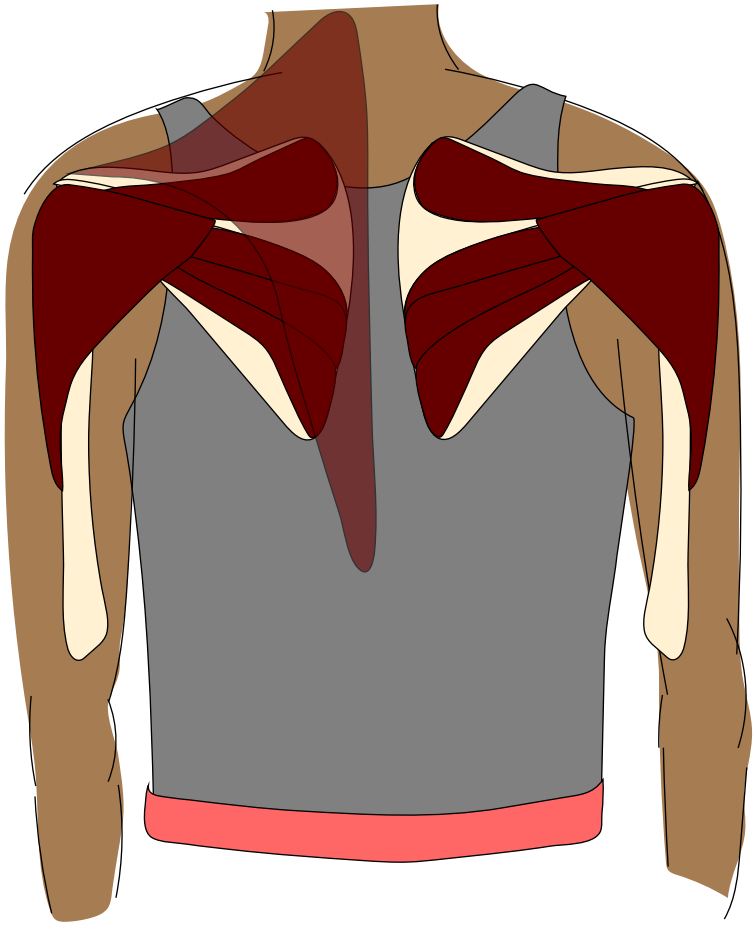
Observe Pt walk, turn, and return. Also observe Pt's tandem gait, heel, and toe walking. Gait abnormalities can be due to primary musculoskeletal, neuromuscular junction, or primary neurologic disorders. It is probably best to have a systematic approach to observing and describing gait (e.g. posture, step size, movement at each joint, arm swing, turning). Also make sure to document the types of ambulatory assist devices (e.g. cane, walker) required, including the handedness of any unilateral assists, as a clear record of this may serve as documentation of disease progression in certain clinical situations (e.g. multiple sclerosis)

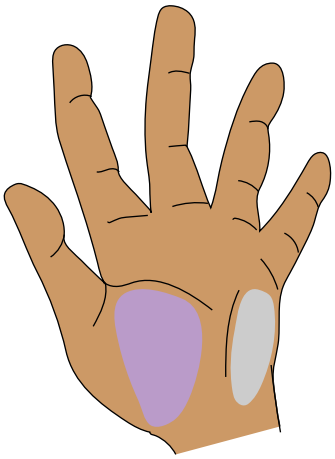


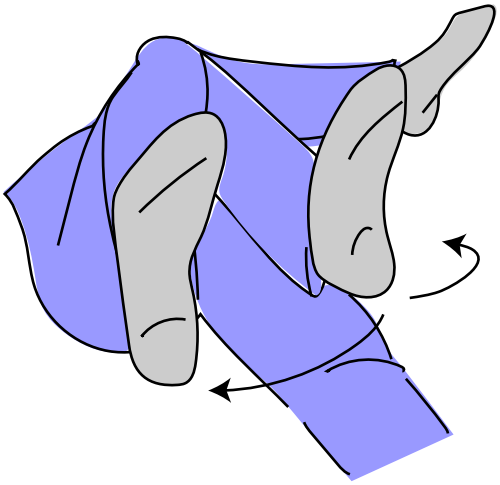
Gait analysis as a diagnostic tool

Observational gait analysis can be particularly useful in helping to distinguish between different processes associated with dementia. A gait disorder in a patient with dementia makes Alzheimer's Disease 30% less probable, whereas a Parkinsonian "shuffling" gait (depicted above) increases the probability of Lewy Body Dementia or Parkinsons with dementia by 40%. Distinguishing between neurodegenerative disorders like Parkinsons and Alzheimers is important because definitive the treatments for these conditions are quite different, and definitive diagnosis is otherwise only possible with post-mortem studies.

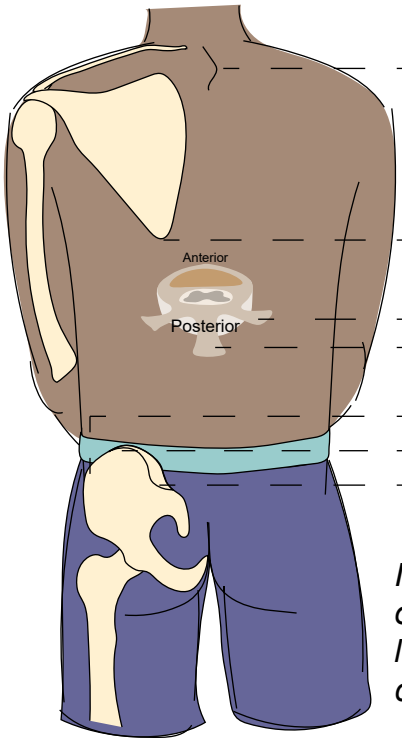
Musculoskeletal







Back Inspection & Palpation



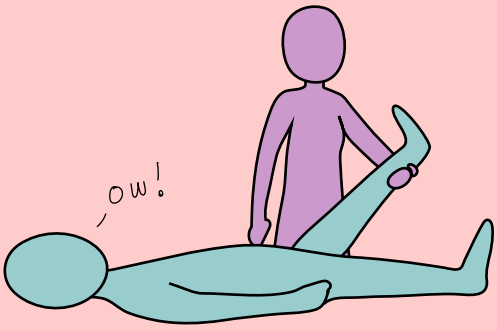
Important anatomic landmarks of the back and the spinal levels at which they are commonly found

85. Inspection
Assess spine and hips for alignment by inspecting and palpating anterior superior iliac spine (ASIS) and posterior superior iliac spine (PSIS). Make note of posture and spinal curvature.

86. Palpation
Palpate the spinous processes (midline bony prominences of spine). The identification of midline bony tenderness, or absence thereof, is a particularly important exam finding in the trauma setting, where it is important to triage patients into those who do and do not need costly follow up imaging studies. And of course, no trauma work up is complete without the handy dandy DRE. Also palpate the paraspinal muscles

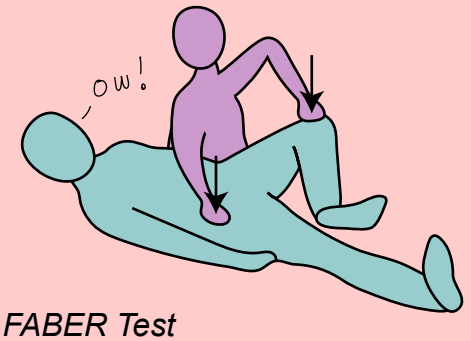
87. Range of Motion:
Assess spinal flexion, extension, side bending, and lateral rotation. Perform special tests, below, as clinically indicated.

88. Straight Leg Test: Sciatica (nerve pain in the distribution of the sciatic nerve) is an extremely common complaint and in these patients, it may be important to evaluate for disc herniation as the underlying etiology. The straight leg test can be useful in this regard. With the Pt supine, passively raise the symptomatic leg with knee extended. A test is positive if this maneuver recapitulates their neuropathy. If the pain is recapitulated with elevation of the contralateral leg (i.e. crossed straight leg test), this increases the probability of underlying disc herniation by ~30% with ~90% specificity. A negative straight leg test decreases the likelihood of disc herniation by ~20%.



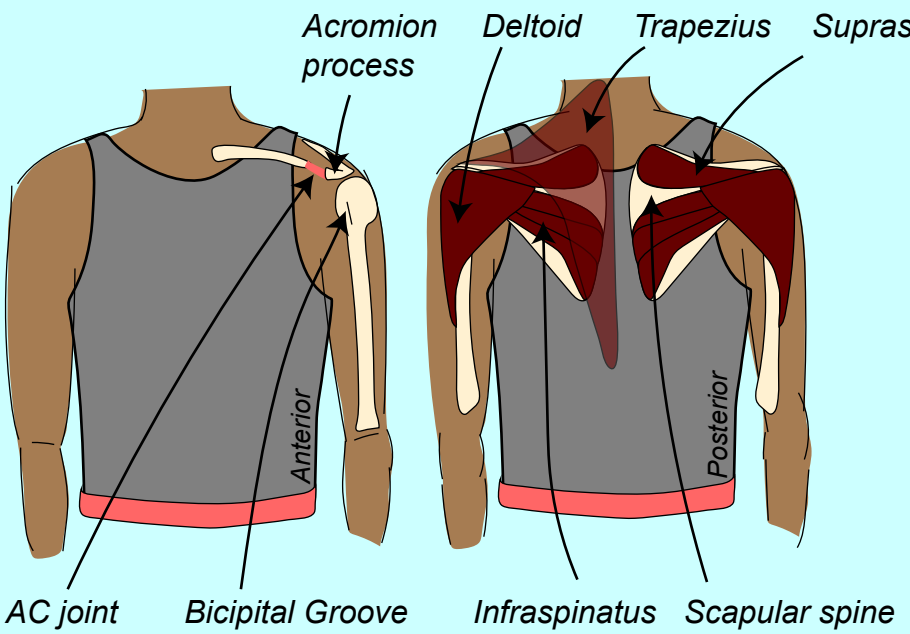
Straight Leg Test

89. Patrick/FABER test: Perform this test when suspicious for sacroiliac or hip pathology. Place one leg in Flexion, ABduction, and External Rotation (FABER) with foot resting above the opposite knee. The opposite leg should be fully extended ("figure four"). Push down on the flexed knee to externally rotate the hip while applying pressure to the opposite ASIS.



FABER Test

Shoulder



90. Inspection:
Assess for symmetry, deformity, and discoloration

91. Palpation:
Palpate skeletal anatomy of the shoulder: Scapular spine, acromion process, acromioclavicular joint, and tendon of the long head of the biceps in the bicipital groove. Palpate the muscular surface anatomy of the shoulder: Trapezius, supraspinatus, infraspinatus, and deltoid.

92. Range of Motion:
Ask pt to flex (bring arms forward), extend (arms backward), abduct (like jumping jacks), internally rotate (elbow flexed, thumb at opposite scapula), and externally rotate (elbow flexed, hands out at sides or behind head) both shoulders.

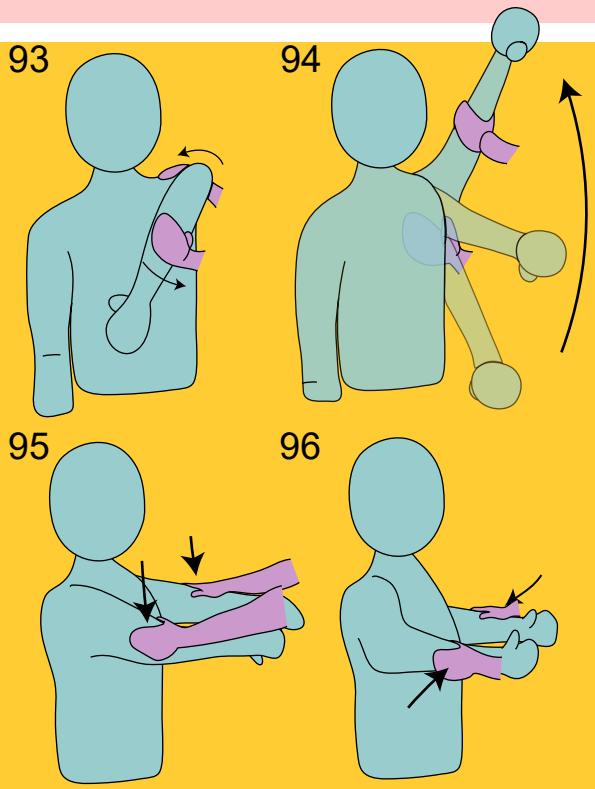
Assessment of Shoulder Pain
When presented with shoulder pain in the outpatient setting, the diagnosis will likely be impingement, adhesive capsulitis (frozen shoulder), or rotator cuff tendinitis or tear. It is useful to be able to distinguish rotator cuff pathology using the following tests as management is very different from the other syndromes.

93. Hawkins Test: A test for *impingement* of rotator cuff muscles. Position Pt as shown. Internally rotate their shoulder to trap any impinged rotator cuff muscles/tendons between surrounding bony structures.

94. Neer Test: Another test for impingement. Position Pt as shown. Raise arm in foward flexion of the shoulder.

95. Empty Can Test: A test for supraspinatus tendon impingement/weakness. Position Pt as shown and apply downard pressure on forearms while asking Pt to resist.

96. Infraspinatus test: Position Pt as shown. Ask them to push their arms apart while you apply resistance



Individually, these tests are of little value in the diagnosis of rotator cuff injury. When (i) impingement, (ii) supraspinatous and (iii) infraspinatus weakness are observed together, the LR for a rotator cuff tear is 48. If only 2/3 are present, LR for a tear is 4.9.

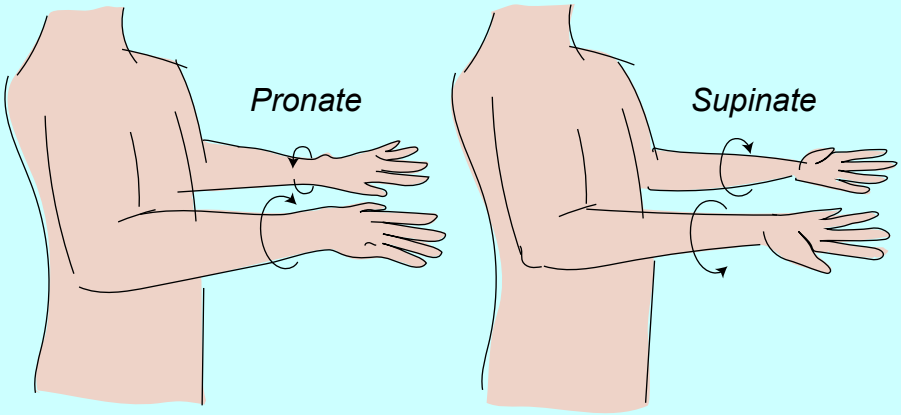
Elbow, Wrist, and Hand

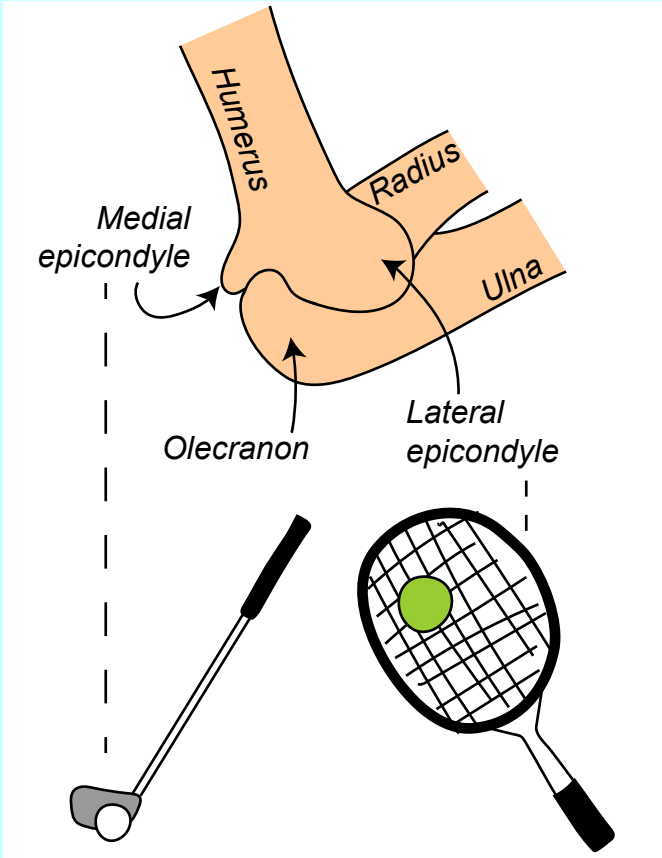
Elbow

97. Inspection:
Assess for symmetry, deformity, and discoloration

98. Palpation:
Palpate lateral epicondyle, medial epicondyle, and olecranon process

99. Range of Motion
Ask Pt to flex, extend, pronate, (elbow at 90 degree, palm down) and supinate (elbow at 90 degree, palm up at the elbow.





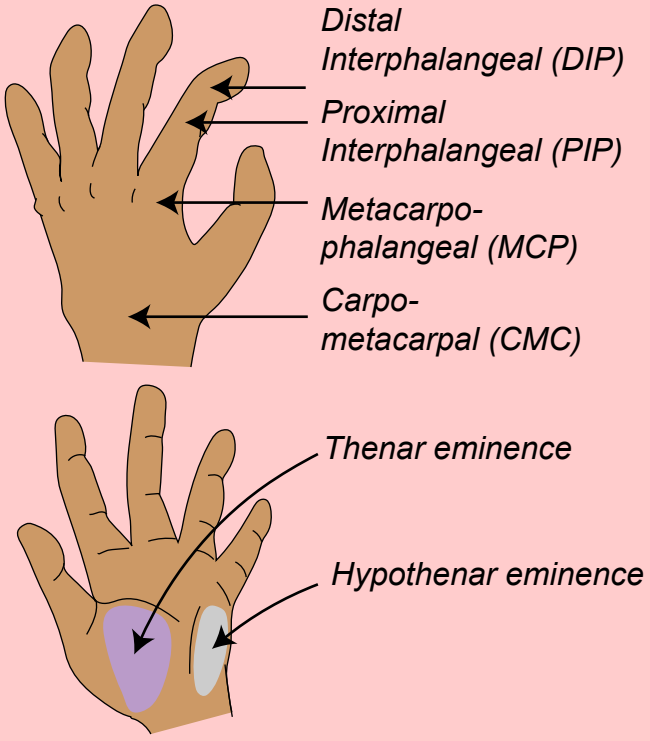
(A) Anatomic landmarks of the right elbow in flextion; (B) Medial epicondylitis = golfer's elbow; Lateral epicondylitis = tennis elbow.

Wrist and Hand

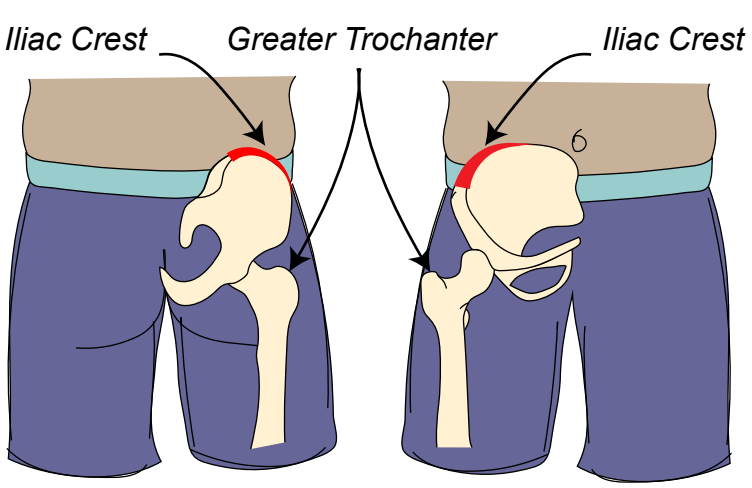
100. Inspection:
Assess symmetry, deformity, and discoloration of the hands, as well as the thenar and hypothenar eminences.

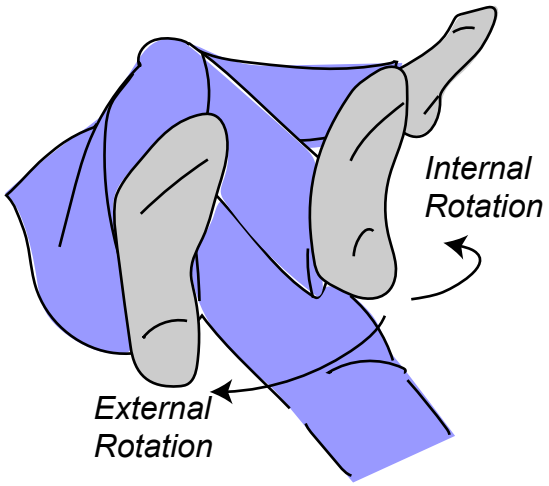
101. Palpation:
Palpate the wrist, CMC, MCP, PIP, and DIP joints

102. Range of Motion:
Ask Pt to flex and extend wrists, to move hand to ulnar and radial sides, to extend fingers at MCP joint with fingers straight, and to make fist bilaterally.



Hip and Knee





Hip

103-104. Inspection:
103. Assess the proximal hip muscles by asking Pt to rise from chair.
104. Assess hips, knees, ankles, and feet for symmetry, deformity, discoloration while standing

105. Palpation:
Palpate iliac crest and greater trochanter of the femur

106-109. Range of Motion:
106. With Pt prone or standing, extend Pt's hip
107. With Pt supine, flex Pt's hip with knee flexed
108. With Pt supine and knee flexed to ~90deg, internally and externally rotate Pt's hip
109. With Pt supine, adduct and abduct Pt's hip

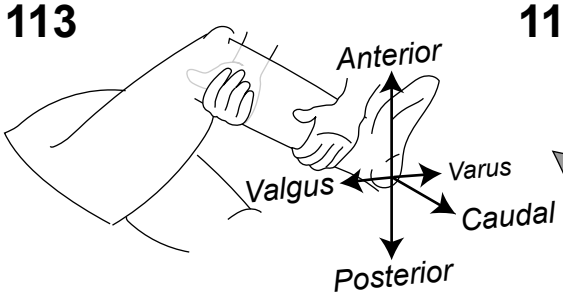
Knee

110. Inspection:
Inspect knee with Pt supine for swelling and discoloration

111. Palpation:
Palpate the popliteal space, the tibiofemoral joint space laterally and medially, patella, and fibular head.

112. Range of Motion:
Ask Pt to flex and extend knee bilaterally

113



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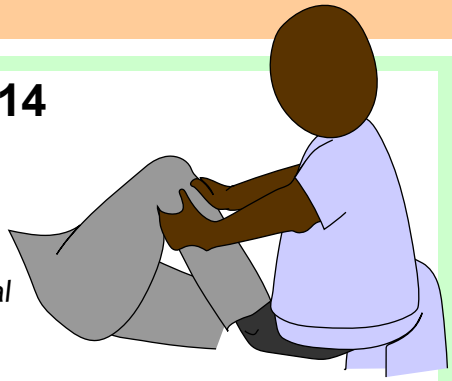


113. Mediolateral Instability
Flex knee to 30 deg, apply varus and valgus stress to knee assessing for medial and lateral laxity. Note, use one hand to stabilize the knee and keep it fixed in one position. Use the other to provide the mediolateral stressor

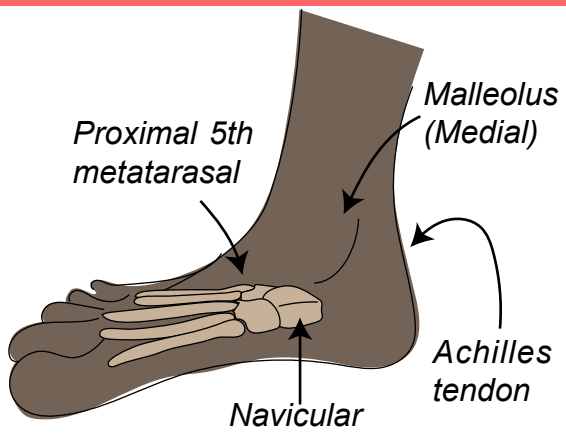
114. Cruciate Ligament (Drawer Test)
Flex knee to 90 deg stabilize foot by lightly sitting on it, and pull tibia anteriorly. Also push posteriorly.

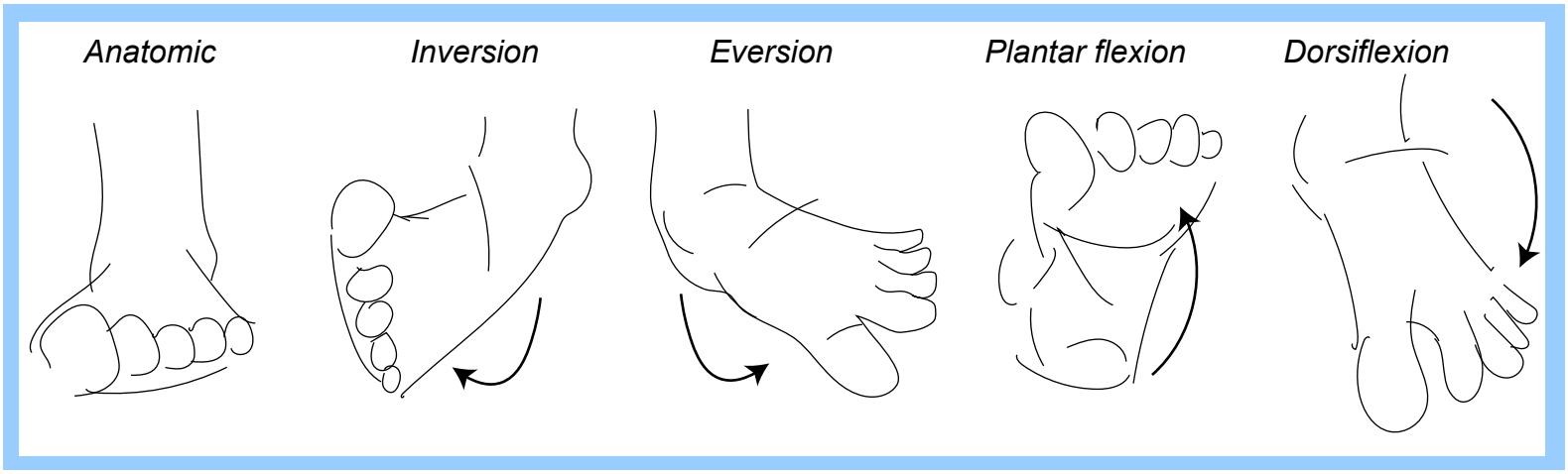
Ankle and Foot

115. Inspection:
Inspect for swelling or discoloration

116. Palpation:
Palpate Achilles' tendon, lateral and medial malleoli, proximal 5th metatarsal, and navicular bone.

117. Range of Motion:
Ask Pt to dorsiflex, plantar flex, evert, and invert the ankle





	Exam Finding	Sensitivity (%)	Specificity (%)	LR if present	LR if absent
Detecting osteoarthritis in Pts with hip pain	Unable to interally rotate hip > 15 degrees	39	96	9.9	0.6
	Squat causes posterior hip pain	24	96	6.1	NS
	Abduction or adduction causes groin pain	33	94	5.7	NS
Detecting osteoarthritis in Pts with knee pain	Bony enlargement	55	95	11.8	0.5
	Varus deformity	22	93	3.4	0.8
	Morning stiffness < 30 min	85	72	3	0.2
	Crepitus with passive motion	89	58	2.1	0.2
	Palpable increase in temperature	14	52	0.3	1.6
Detecting knee ligatment injuries	Anterior drawer sign detecting ACL tear	27-94	91-99	13.6	0.4
	Posterior drawer sign detecting PCL tear	90-95	99	97.8	0.1
	Valgus stress laxity detecting MCL injury	79-89	49-99	7.7	0.2
	Varus stress laxity detecting LCL injury	25	98	16.2	NS