Examination Of The Heart

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Cardiac Exam

• Includes Vital Signs & Pulmonary Exam
• 4 basic **components** of cardiac, pulmonary and abdominal exams:
  – Observation
  – Palpation
  – Percussion (omitted in cardiac exam)
  – Auscultation
Observation

• Pay attention to many of same things as w/lung exam
  – Chest shape
  – Shortness of breath (@ rest or walking)?
  – Sitting upright? Able to speak?
  – ? Visible impulse on chest wall from vigorously contracting ventricle (rare)
Anatomy

(please wait for video to load)
Surface Anatomy
Valves And Surface Anatomy

- Areas of **auscultation** correlate w/rough **location** of ea **valve**
- Where you listen will determine what you hear!

More Anatomy @ Blaufuss Medical
Palpation

To assess:

• **Left** Ventricle (LV):
  – **Vigor** of **contractility** of underlying ventricle – if prominent, referred to as heave or lift
  – **Size** of LV

• **Right** Ventricle:
  – Vigor of contractility

• **Thrill** – rare **palpable sensation** associated w/regurgitant or stenotic murmurs (feels like sensation when kink garden hose)
Palpation - Technique

- **L ventricle** → **fingers** across **chest**, under breast (explain 1st to female pts!)
- Pay attention to/identify
  - **Point of Maximal Impulse (PMI)** → location apex ventricle – discrete area that pin-point w/finger tip ~70% of patients - if not palpable, repeat w/patient on L side
  - **Vigor** of contraction
  - **Palpable thrill** (rare)
Palpation – Technique (cont)

- **Right** ventricle:
  - Vigor of **contractility**
    → **heel of R hand**
    along sternum
Auscultation: Using Your Stethoscope

They all work - most important part is what goes between the ear pieces!

Diaphragm → Higher pitched sounds
Bell → Lower pitched
What Are We Listening For?

- Normal valve closure creates sound
- First Heart Sound = S1 → closure of **Mitral, Tricuspid** valves
- Second Heart Sound = S2 → closure of **Pulmonic, Aortic** valves

Courtesy Wilbur Lew, M.D.
What Are We Listening For? (cont)

- **Systole** = time between S1 & S2; **Diastole** = time between S2 & S1
- Normally, S1 & S2 = **distinct** sounds
- **Physiologic splitting** = 2 components of second heart sound (Aortic & Pulmonic valve closure) audible w/inspiration

Ohio State University School of Medicine Interactive Learning Center – Basic Heart Sounds
Finding The Sternal Manubrial Angle (AKA Angle of Louis) – Key To Identifying Valve Areas

Manubrium slopes in one direction while Sternum angles in different direction. Highlighted by q-tips→intersection defines Angle of Louis.
Auscultation Technique

- Patient lying @ 30-45 degree incline
- Chest exposed (male) or loosely fitted gown (female)
  - need to see area where placing stethoscope
  - stethoscope must contact skin
- Stethoscope w/diaphragm (higher pitched sounds) engaged
Remember – Don’t Examine Thru Clothing!
Exam Options When Ausculting Female Patients
Auscultation Technique (cont)

1. Start over *aortic area*→*2nd Right* Intercostal Space (ICS) – Use Angle of Louis as landmark
2. *Pulmonic* area (*2nd L ICS*)
3. Inch down sternal border→*tricuspid* area (*4th L ICS*)
4. Inch towards *mitral* area (*4th ICS, mid-clavicular*)

Listen in ~ *6 places* - precise total doesn’t matter – simply gives you sense of change in sounds as change location
Auscultation

• In each area, ask yourself:
  – Do I hear S1? Do I hear S2? Which is **louder** & what are relative **intensities**?

• **Interval between S1 & S2** (systole) is **shorter** than between S2 & S1 (diastole)

• Can also determine **timing** by simultaneously **feeling pulse** (a **systolic** event)

• **Listen for physiologic splitting** of 2nd heart sound w/inspiration
Murmurs

- **Murmurs**: Sound created by turbulent flow across valves:
  - Leakage (regurgitation) when valve closed
  - Obstruction (stenosis) to flow when normally open

- **Systolic Murmurs**:
  - Aortic stenosis, Mitral regurgitation (Pulmonary stenosis, Tricuspid regurgitation)

- **Diastolic Murmurs**:
  - Aortic regurgitation, Mitral stenosis (Pulmonary regurgitation, Tricuspid stenosis)

Image Courtesy Wilbur Lew, MD
UCSD SOM

Figure 4: Cardiac cycle in left and right hearts
Murmurs (cont)

- Characterized by: **position** in cycle, **quality**, **intensity**, **location**, **radiation** – can try to draw it’s shape:

  ![Diagram of early peaking murmur and mitral regurgitation]

- **Intensity Scale:**
  1 – barely audible  
  2 - readily audible  
  3 - even louder  
  4- loud + thrill  
  5- audible with only part of diaphragm on chest  
  6 – audible w/out stethoscope

- **intensity doesn’t necessarily correlate w/severity**

- Some **murmurs** best appreciated in certain **positions**:
  - **Mitral**: patient on **L side**; **Aortic**: sitting up and leaning **forward**

- Example – **Mitral Regurgitation**: Holosystolic, loudest in mitral area, radiates towards axilla.

[UCLA Heart Sound Simmulator](http://www.wilkes.med.ucla.edu/)
[Blaufuss Medical - On Line Tutorial](http://www.blaufuss.org/)
Extra Heart Sounds – S3 & S4

- **Ventricular** sounds, occur during diastole
  - normal in young patient (~ < 30 yo)
  - usually LV, rarely RV

- **S3** → follows S2
  - caused by blood from LA colliding w/"left over" blood in LV
  - assoc w/heart failure.

- **S4** → precedes S1 –
  - caused during atrial systole
  - when blood squeezed into non-compliant LV
  - assoc w/HTN
Extra Heart Sound (cont)

- S3 & S4 are soft, low pitched
  - [Blaufuss Medical - On Line Tutorial](http://www.blaufuss.org/)

- Best heart w/bell, laid over LV, w/patient lying on L side (brings apex of heart closer to chest wall) – can also check over RV (4th ICS, L parasternal)

- Abnormal beyond age ~30

- When present, S3 or S4 are referred to as “gallops”
  - [Ohio State University School of Medicine Interactive Learning Center – Heart Sounds – Simulated S3 & S4](http://www.blaufuss.org/)
Auscultation – An Ordered Approach

• Do I hear **S1**? Do I hear **S2**?
  – Listen in *ea major valvular* area – think about which sound should be loudest in ea location (S1 loudest region of TV & MV, S2 loudest AV & PV)

• Do I hear **physiologic splitting** of **S2**?

• Do I hear something before S1 (an **S4**) or after S2 (an **S3**)?

• Do I hear **murmur in systole**? In **diastole**?

• **If** a **murmur** present, note:
  – intensity, character, duration, radiation

• As listen, think about **mechanical events** that generate the sounds.
Carotid Arteries

- **Anatomy**
- **Palpation** (ea side separately!)
  - Rhythm
  - Fullness
- **Auscultation**
  - Radiation of murmurs
  - ? Intrinsic atherosclerosis – may produce “shshing” noise known as bruit
Jugular Venous Pressure (JVP)

• **Anatomy** of Internal Jugular Vein
• **Straight line with RA**
• **Manometer**→ reflecting Central Venous Pressure (CVP)
JVP Technique

- **Find** correct area – helps to first identify SCM & triangle it forms w/clavicle
- Look for **multi-phasic pulsations** (‘a’, ‘c’ & ‘v’ waves)
- **Isolate** from carotid pulsations, **respirations**
- **Tangential lighting**
- **Hepatojugular reflux** (gentle pressure over liver pushes blood back into IJ & makes pulsations more apparent)
JVP Technique (cont)

- **JVP = s 5cm** (height sternal-manubrial angle is above RA) + vertical distance from sternal-manubrial angle to top of pulse wave

Assessing JVP - Anatomic and other Considerations
(http://www.cuhk.edu)
Summary Of Skills

- Wash hands
- Inspect precordium
- Palpation of RV and LV; Determination PMI

Auscultation

- S1 and S2 in 4 valvular areas w/diaphragm
  - Try to identify physiologic splitting S2
  - ? Murmurs
- Assess for extra heart sounds (S3, S4) w/bell over LV
- Carotid artery palpation, auscultation
- Jugular venous pressure assessment

Time Target: < 10 min