WEB SITES OF INTEREST

Health Assessment Courses from New York University, Division of Nursing:
Features study guides for health assessment and links to case studies for the following topics:
- History-taking & documentation
- Techniques & Equipment
- Integument
- Head & neck
- Lung & thorax
- Cardiovascular
- Abdominal
- Male & female genitalia
- Musculoskeletal
- Neurological
http://www.nyu.edu/classes/kirton/

The Auscultation Assistant: Review of cardiac sounds, murmurs & associated pathologies:
UCLA site:
http://www.med.ucla.edu/wilkes/intro/html

Cardiology Pathology Index: Myocardial Infarction Tutorial: Pathology Slides
http://medstat.med.edu/WebPath/CVHTML/CVIDX.html

Cardiovascular Disease: Anatomy Review
http://www.bu.edu/cohis/cardvasc/intro/hrtlook.htm

EKG Reviews & Links to Other EKG Sites:
http://homepages.enterprise.net/djenkins/ecghome.html

Cardiovascular System:
often described as a maze of tubing and a wondrous pump

Structures of Significance
Heart and neck vessels
- Aorta - arch & thoracic
- Common carotid arteries
- Internal jugular veins
- Superior vena cava
- Right atrium
- Right ventricle
- Pulmonary artery
- Left atrium
- Left ventricle
Apex
Base
Pericardium
Myocardium
Endocardium
Septum
Tricuspid (AV) valve
Mitral (AV) valve
Pulmonic (SL) valve
Aortic (SL) valve

**Accessible arteries**
- Temporal
- Carotid
- Aorta
- Brachial
- Ulnar
- Radial
- Femoral
- Popliteal

**Dorsalis pedis**
- Posterior tibial

**Accessible veins**
- Jugular
- Superficial & deep arm veins
- Femoral (deep)
- Popliteal (deep)
- Great & small saphenous (superficial)

**Accessible lymphatic tissue**
- Cervical chains
- Axillary chains
- Epitrochlear
- Inguinal
- Tonsils
- Thymus
- Spleen

**Functions of Significance**

**Heart**
- Cardiac Cycle
- Conductive system

**Peripheral Vascular Circulation**
- Arterial
- Venous

**Lymphatics**
- Conserve fluid & plasma
- Major part of the immune system
- Absorb lipids from intestinal tract
Most Common Cardiovascular Problems

**Coronary Artery Disease (CAD)**

Hypertension (HTN)
- 80% of US population

**Rheumatic Heart Disease (RHD)**
- Sequelae of beta hemolytic strep infections
- Resulting valvular damage more likely seen in older adults, who may not have been treated for strep
- Jones Criteria used to establish new diagnosis

**Bacterial Endocarditis (BE)**
- Bacteremia causes valvular damage

**Congenital Heart Disease (CHD)**
- Greatest portion diagnosed early in life

Cardiac History - What are the patient’s risk factors &/or symptoms?

- **Risk Factors (Noncorrectable)**
  - What are the unmodifiable risk factors?
    - Age, sex, personality type
    - Family Hx. - sudden death, HTN, stroke or MI prior to 50, severe hyperlipidemia, DM
    - PMH - arrhythmias, murmurs, CHF, rheumatic disease, cardiac surgery, bleeding disorders, aneurysms, DVT (deep vein thrombosis), emboli, or hypo-, hyperthyroidism
    - Diabetes mellitus (belongs in both lists)
    - Coronary artery disease (belongs in both lists)
    - Congenital heart defects

- **Risk Factors (Correctable)**
  - What are the modifiable risk factors?
    - Smoking
    - Employment: physical vs. emotional demands, environmental hazards, stress management
    - Nutritional status: body fat & type of diet
    - Anaerobic exercise
    - Estrogen replacement (if postmenopausal)
    - Drug use - alcohol, cocaine, prescription & OTC
    - Essential HTN
    - Hypercholesterolemia
BACKGROUND INFORMATION SIGNIFICANT FOR RISK FACTORS:

- **Hypertension Classifications: NIH, 6th Report, 1997**

<table>
<thead>
<tr>
<th>Adults: Category</th>
<th>Systolic (SBP)</th>
<th>Diastolic (DBP)</th>
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<tbody>
<tr>
<td>Normal</td>
<td>&lt;130</td>
<td>&lt;85</td>
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<tr>
<td>High normal</td>
<td>130-139</td>
<td>85-89</td>
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<tr>
<td>Hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage I (mild)</td>
<td>140-159</td>
<td>90-99</td>
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<tr>
<td>Stage II (moderate)</td>
<td>160-179</td>
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<tr>
<td>Stage III (severe)</td>
<td>180-209</td>
<td>110-119</td>
</tr>
<tr>
<td>Stage IV (very severe)</td>
<td>≥210</td>
<td>≥120</td>
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</tbody>
</table>

**Children:**
- Normal: < 90th %ile systolic & diastolic
- High normal: 90-95th %ile systolic & diastolic
- Hypertension: > 95th %ile systolic &

- **Arm Blood Pressure:** May be 5-10 mm Hg higher in right arm than left arm: greater differences between right & left arm may be associated with congenital aortic stenosis or acquired conditions, such as aortic dissection or obstruction of arteries of the upper arm

  **Supravalvular Aortic Stenosis:** HTN in Rt. Arm & hypotension in lt. Arm

- **Leg Blood Pressure:** Arm & leg blood pressures are about equal during the first year of life & after that time the leg blood pressure is 15-20 mm Hg higher than arm blood pressure

  **Coarctation of Aorta:** Leg BP lower than arm BP

- **Pulse Pressure:**
  - difference between systolic & diastolic blood pressures:
    - usual adult pulse pressure is between 30 – 40 mm Hg
      (even as high as 50 mm Hg): example: pulse pressure may widen with systolic hypertension, may widen with increased intracranial pressure
    - may be wider in children (between 20 – 50 mm Hg): examples: wide pulse pressure more than 50 mm Hg in children may indicate congestive heart failure:
      **narrow** pulse pressure less than 10 mm Hg may indicate aortic stenosis
• **Orthostatic Hypotension:** Decrease in systolic BP of 20-30 mm Hg or more when changing from supine to standing position, & increase in pulse of 10-20 bpm: sudden drops may result in fainting. Dizziness & faintness from orthostatic hypotension may occur when taking antihypertensive medications, volume depleted, confined to bed or in the elderly.

• **Korotkoff sounds:** Turbulent sounds of partial obstruction of arterial flow
  
  Phase I: sharp tapping sound (systolic)
  Phase II: change to soft swishing sound
  Phase III: sounds more crisp & intense
  Phase IV: muffled tapping (first diastolic) *closer to true diastolic in children*:
  record for diastolic in children <13 yrs
  Phase V: cessation of sound (2nd diastolic) *closer to true diastolic in adults*:
  record for diastolic in children >13 yrs & adults
  American Heart Association recommends Recording systolic/1st diastolic/2nd diastolic

• **Auscultatory gap:** silence caused by disappearance of Korotkoff sounds after initial appearance and are then heard 10-15 mm Hg later: can be mistaken for lower SBP reading (point of reappearance): can be associated with decreased peripheral flow, such as hypertension or aortic stenosis.

• **Pulse: Common Definitions & Abnormalities**

  **Pulse Deficit:** A difference between the apical & peripheral pulse.(peripheral pulse rate subtracted from apical pulse): normally “zero;” or no difference: a pulse deficit indicates weak pulses/heart beats

  **Bigeminal Pulse:** Normal pulse is followed by premature contractions, which are weaker than the normal pulse. Rhythm is irregular. Possible causes: premature ventricular contraction or atrial contraction

  **Pulses Alterans:** Pulses have large amplitude beats followed by pulses of low amplitude. Rhythm remains normal. Possible cause: left sided congestive heart failure

  **Pulsus Paradoxicus:** An exaggeration of the normal paradoxical pulse, defined as a *normal fall of approximately 5 mm. Hg* in systolic arterial blood pressure during inspiration, as compared to expiration. A *difference of more than 10 mm. Hg* is abnormal *pulsus paradoxicus*. Possible causes: cardiac tamponade, constrictive pericarditis, obstructive lung disease. It is tested better by BP evaluation of systolic pressure than by pulse palpation.
Palpitations: Unpleasant sensations of awareness of the heartbeat: described as skipped beats, racing, fluttering, pounding or irregularity: may result from rapid acceleration or slowing of heart, increased forcefulness of cardiac contraction: not necessarily associated with heart disease

- Cholesterol Issues

  - Serum Lipid Levels:
    - Used to determine risk for coronary heart disease
    - **TCHOL**: Total cholesterol Elevations increase risk
    - **TG**: Triglycerides Elevations increase risk
    - **LDL**: Low density lipoprotein Elevations increase risk
    - **HDL**: High density lipoprotein Elevations decrease risk

Serum Lipids: Optimum Levels
Measured in mg/dl

<table>
<thead>
<tr>
<th></th>
<th>Adults</th>
<th>Children</th>
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<tbody>
<tr>
<td><strong>TCHOL</strong> (acceptable)</td>
<td>&lt;200</td>
<td>&lt;170</td>
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<tr>
<td>(borderline)</td>
<td>200-239</td>
<td>170-199</td>
</tr>
<tr>
<td>(high)</td>
<td>&gt;240</td>
<td>&gt;200</td>
</tr>
<tr>
<td><strong>Triglycerides</strong></td>
<td>&lt;200</td>
<td>&lt;150</td>
</tr>
<tr>
<td><strong>LDL</strong> (70% of total)</td>
<td>&lt;130</td>
<td>&lt;110</td>
</tr>
<tr>
<td>(acceptable)</td>
<td>&lt;110</td>
<td></td>
</tr>
<tr>
<td>(borderline)</td>
<td>110-120</td>
<td></td>
</tr>
<tr>
<td>(high)</td>
<td>&gt;130</td>
<td></td>
</tr>
<tr>
<td><strong>HDL</strong> (25% of total)</td>
<td>&gt;35</td>
<td>&gt;35</td>
</tr>
</tbody>
</table>

- Cholesterol & Children:
  - Universal screening not recommended
  - Yes: Family history of cholesterol >240, premature CVD
  - Yes: Lifestyle risk factors

CARDIAC CONSIDERATIONS

- Heart
  - Base: (upper) aortic & pulmonic area
  - Apex: (lower) mitral area
  - Left side: high pressure flow
  - Right side: low pressure flow
• **Pericardium (pericardial sac)**
  - **Anchors:**
    - Bottom to diaphragm
    - Top to upper sternum
  - **Visceral** or epicardial sac (inner lining):
    - Insensitive to pain
  - **Parietal** (outer lining)
    - Innervated by phrenic nerve & sensitive to pain

• **Impulse Conduction:**
  - Heart is innervated by autonomic nervous system
    - Sympathetic: stimulates
    - Parasympathetic: slows
  - Sinoatrial (SA) node: located in right atria,
    Generates impulses that travel through the conduction system & produce cardiac muscle contractions
  - Atrioventricular (AV) node: located in the atrial septum
  - Bundle of His: right & left bundle branches
  - Purkinje fibers: located in ventricular myocardium, where ventricular contraction takes place

• **Location of left ventricular apex & PMI (point of maximum impulse)**
  - **Adults:** 5th ICS, MCL
  - **Infants:** 4th ICS, left of MCL
  - **Pregnancy:** PMI moves 1-2 cms left of MCL & up to 4th ICS

• **Cardiac Auscultation:**
  - **Stethoscope:**
    - diaphragm: high pitched sounds
    - bell: low pitched sounds
    - listen: to one sound at a time, over valvular areas
  - **Aortic:** 2nd ICS, RSB S2 is loudest
  - **Pulmonic:** 2nd ICS, LSB S2 is loudest
  - **Erbs Point:** 3rd ICS, LSB
  - **Tricuspid:** 4th ICS, LSB S1 is loudest
  - **Mitral (Apex)** 5th ICS, MCL S1 is loudest

• **Consider Cardiac Cycle When Listening**
  - **S1:** Represents ventricular contraction & ejection:
    - S1 sound is produced by closing of Atrial ventricular (AV) valves:
      - **Tricuspid & Mitral valves**
  - **S2:** Represents ventricular relaxation & filling:
    - S2 sound is produced by closing of Semilunar valves:
      - **Aortic & Pulmonic valves**
• When a clicking or snapping sound is heard, it usually means that damaged valves are heard upon opening rather than upon closing (which essentially reverses the valvular sound patterns):

  **S1:** called an “ejection click”
  The sound is produced by the opening of damaged semilunar valves (aortic or pulmonic)

  **S2:** called “opening snap”
  The sound is produced by the opening of damaged atrial ventricular (AV) valves (tricuspid or mitral):
  **Example:** Mitral stenosis produces an S2 opening snap

• **Continued: Cardiac Cycle:**

  **S3:** Can be normal in children & young adults
  Over 30 years of age: “Ventricular Gallop”
  Associated with CHF

  **Rhythm simulation:**
  SLOSH- ING- IN TENN- E- SSEE
  S1 S2 S3 S1 S2 S3

  **S4:** Possible to be normal in children & young adults
  Over 30 years: noncompliant or stiff ventricle
  Hypertrophy of ventricle, CHF, CAD

  **Rhythm simulation:**
  A- STIFF- WALL KEN- TU- CKY
  S4 S1 S2 S4 S1 S2

• **Sinus Arrhythmia:** Normal rhythm
  **Normal splitting of S2**
  - Refers to the physiologic splitting of S2 (reflects the time delay between closure of the aortic and pulmonic valves)
  - S2 split “widens” or increases during an inspiratory breath (heart rate slows)
  - S2 split “narrows” or decreases with breath expiration (heart rate increases)
Abnormal S2 split & selected examples:
See text for additional examples

- **Wide:** delayed emptying of right ventricle &
delayed closure of pulmonic valve
Examples: Right Bundle Branch Block,
Pulmonic stenosis

- **Fixed:** split of S2 is affected by respiration
Example: ASD

- **Paradoxical:**
  Physiologic split reverses:
  Narrows with inspiration &
  Widens with expiration
Example: Left Bundle Branch Block,
Aortic Stenosis

**Jugular Venous Pressure**

- Reflects pressures in right side of heart
- Assess the internal jugular vein if possible
- Venous pulsations are visible, but not palpable
- Pulsations best visible with patient sitting a
  45 degree angle (45-60)
- Measure highest level of pulsations,
  From the sternal angle
- Pressures > 3-4 cms above the sternal angle
  are elevated

**HEART HISTORY: SIGNIFICANT SYMPTOMS**

- Chest Pain
- Palpitations or other irregularities of rhythm
- Dyspnea
- Syncope
- Fatigue
- Dependent edema
- Hemoptysis
- Cyanosis

**PERIPHERAL VASCULAR & LYMPHATIC HISTORY:**
**SIGNIFICANT SYMPTOMS**

- Pain
- Changes in skin temperature color
- Edema
- Ulceration
- Emboli
- Stroke
- Dizziness
HISTORY:
What symptoms of abnormalities are present? (Document OLD CART)
- Chest pain
- Anxiety
- Dyspnea
- Diaphoresis
- Syncope or near syncopal episodes
- Nausea
- Edema
- Lymphadenopathy
- Fatigue
- Pallor
- Palpitations
- Leg ulcerations - atrophy, hair loss
- Diabetic neuropathy (esp. without sweat)
- Claudication

CHEST PAIN: KEY POINTS

- **Cardiac Pain**
  - Levine’s sign
  - Exertion, emotion, eating, cold or stress: before pain
  - Substernal, retrosternal
  - Mild to severe, diffuse
  - Deep, pressure, squeeze, heavy, strangle
  - May radiate: jaw, arms, neck, back
  - Stereotyped for individual:
    - Variations indicate change, unstable angina
  - Subsides with rest, Nitroglycerine

**Angina:**
- Episodic, “seizes:
  - Duration short: 2-3 minutes
  - Range: > 1 & > 10 minutes

**Acute MI:**
- Steady, deep pain: chest constriction, crushing
  - Lasts 20 minutes or longer
  - May not be relieved by nitroglycerine
  - Nausea, vomiting, diaphoresis
  - May occur at rest, with exertion or stress

- **Pericarditis Pain**
  - Deep, constant or pleuritic
  - Pericardial friction rub
  - Increases with cough
  - Sharp, stabbing
  - Fever or recent infection
  - Shallow breathing, sitting up, leaning forward relieves
• **Pulmonary Pain**
  - Onset gradual or sudden (days: viral; hours: bacterial)
  - Fever, infection, cough (sputum, blood)
  - Pain over lung fields
  - Mild to severe, sharp ache
  - Air hunger, dyspnea, restlessness
  - Splinting, moist air, rest, heat, sitting up may relieve

• **Respiratory Movement Pain**
  - Pleurisy, overuse, trauma
  - Sharp, burning, stabbing, shooting, deep
  - Crushing or tearing sensations

• **Musculoskeletal: Chest Wall Pain**
  - Tenderness to palpation of chest wall
  - Chest wall maneuvers may precipitate pain
  - Examples: rib fracture, arthritis, muscle spasm or myositis, chostrochondritis, slipping cartilage

• **Gastrointestinal**
  - Gradual or sudden onset
  - Esophagitis & gastritis may occur after eating, leaning over
  - Pain may be burning, retrosternal, epigastric or radiate
  - Mild to severe
  - Intermittent or continuous
  - Food, antacid, standing, belching may relieve
  - Emotional stress, caffeine, spices, heavy meals
  - Cold liquids, alcohol, exercise, smoking may aggravate

• **Palpitations: Arrhythmias: Consider**
  - Cardiac
  - Thyrotoxicosis
  - Hypoglycemia
  - Fever
  - Anemia
  - Anxiety
  - May not indicate serious disease
  - Other factors: caffeine, tobacco, drugs
PERIPHERAL VASCULAR & LYMPHATIC HISTORY

- **Arteries**
  - Atherosclerosis: ischemia & aneurysms
  - Microvascular disease: diabetes, ischemia, peripheral neuropathy
  - Ischemia of extremities

- **Veins**
  - Venous stasis: pigmentation, dermatitis, cellulitis, ulceration
  - Thrombus formation

- **Lymphatics**
  - Generalized palpable lymph nodes: 3 or more lymph node chains: Systemic disease processes
  - Lymphangitis: thin red steaks on skin
  - Lymphedema: obstruction of lymphatic flow

- **Pain**
  - Intermittent claudication: atherosclerosis, Lower extremity pain during exercise, at rest
  - Pseudoclaudication: musculoskeletal disease in lumbar area

- **Skin Changes**
  - Arterial insufficiency: cool, pale
  - Venous insufficiency: warm, erythematous, erosions
    Increased pigmentation, swelling, aching or heaviness in legs

- **Edema**
  - Lymphedema: painless, “heaviness,” firm, nonpitting, Rough skin texture

- **Ulceration**
  - Arterial insufficiency: painful, discrete edges, erythematous if infected, occur rapidly with trauma
  - Venous insufficiency: stasis ulceration, diffusely reddened, Thickened cobblestone appearance, slowly developing

- **Emboli**
  - Results from stasis & hypercoagulability
  - Consider: bedrest, CHF, obesity, pregnancy, oral contraceptive: associated with thrombus & emboli

- **Neurologic Symptoms**: due to arterial occlusive processes
• **Dyspnea:** Consider
  • Cardiac: Left ventricular failure, mitral stenosis
  • Paroxysmal nocturnal dyspnea: CHF
  • Orthopnea: CHF
  • Dyspnea with exertion
  • Pulmonary etiology
  • Emotional
  • High altitude
  • Anemia

• **Syncope:** Consider
  • Fainting, dizziness, blackout
  • Cardiac etiology
  • Metabolic etiology
  • Psychiatric etiology
  • Neurologic etiology
  • Vasovagal-vasodepression: during periods of emotional strain
  • Micturation-visceral reflex: males, straining with nocturnal Urination, associated with alcohol consumption
  • Cough: post-tussive, with COPD
  • Carotid sinus sensitivity: carotid pressure, older adults

• **Fatigue:** Consider
  • Decreased cardiac output
  • CHF
  • Mitral valve disease
  • Anxiety & depression
  • Anemia or chronic diseases

• **Dependent Edema:** Consider
  • CHF
  • Worse as day progresses
  • SOB
  • Edema rating:
    • 1+ = 2 mm
    • 2+ = 4 mm
    • 3+ = 6 mm
    • 4+ = 8 mm

• **Hemoptysis:** Differentiate
  • Hemoptysis: red-pink, frothy
  • Hematomesis: dark, coffee ground

• **Cyanosis:** Consider
  • In lower extremities: differential: R to L shunt: PDA
  • Peripheral: cyanosis of extremities
  • Central: cyanosis of mouth & mucous membranes, indicating fall in O2 saturation
Physical Examination - Inspection. Palpation. Auscultation
Vital signs
   Pulse rate - frequency, regularity & amplitude
   Blood Pressure - both arms, use correct cuff size

EXTRACARDIAC MANIFESTATIONS OF HEART ABNORMALITIES

• **Skin**
  • Cold, clammy perspiration in low-output states
  • Widespread vasodilatation in high-output states
  • Pallor suggests anemia
  • Tight, smooth, shiny skin in scleroderma
  • Cyanosis from either reduced Hbg in the arterial blood or to decreased blood flow

Lesions & further inspection

• **Xanthomata:** firm yellow colored masses, associated with hypercholesterolemia
  • Tendons: located on finger, Achilles & plantar tendons
  • Tuberous: located on hands
  • Eruptive: acute, associated with uncontrolled diabetes, located on abdomen buttocks, elbows, knees & back

• **Erythema marginatum:** in febrile patient: erythematous rash, with disc-shaped, raised edges
  May be associated with **rheumatic fever:**
  • Autoimmune reaction to group A beta hemolytic streptococcal pharyngitis that involves joints, skin, brain, serous surfaces & heart
  • Major manifestations:
    • Carditis (new systolic murmur)
    • Polyarthritis
    • Chorea
    • Erythema marginatum
    • Subcutaneous nodules
  • Diagnostic tests:
    • Throat culture: strep +
    • Antistreptolysin-O-titer + (ASLO)
    • Sedimentation rate: elevated
    • EKG & chest x-ray

• **Rheumatoid nodules:** subcutaneous nodules, associated with rheumatoid arthritis (firm nontender, usually located on extensor surfaces of over tendons)
• **Nails**
  • Splinter hemorrhages: associated with endocarditis
  • Clubbing: associated with cyanotic congestive heart disease (CHD), chronic pulmonary disease, cirrhosis of liver

• **Face, Eyes, Ears**
  • Xanthelasma: yellow plaques on eyelids, associated with hypercholesterolemia
  • Arcus senilis: white-gray ring around exterior portion of iris: normal in older adult: associated with hypercholesterolemia (under 40 yrs)
  • Lens displacement: Marfan’s Syndrome:
    Genetic disorder, associated with congenital heart disease (aortic regurgitation) & other physical characteristics:
    - Lens displacement
    - Arachnodactyly (increased length of distal areas, fingers, feet…)
    - Chest: pectus excavatum or carinatum
    - High arched palate
  • Hypertelorism: wide set eyes may be associated with CHD & other syndromes, such as supravalvular aortic stenosis
  • Ear creasing: before age 60

• **Mouth & Neck**
  • Petichiae on palate: associated with bacterial endocarditis, in acute phase also look for nail splinter hemorrhages
  • High arched palate: Marfan’s syndrome
  • Webbed Neck: Congenital, Turner’s Syndrome, Associated with coarctation of aorta

• **Fundoscopic Exam (Keith-Wagener changes)**
  - **KW I:** minimal arteriolar narrowing
  - **KW II:** nicking + KW I
  - **KW III:** flame hemorrhages, cotton wool patches + KW I, II
  - **KW IV:** papilledema + KW I, II, III
• Extremities & Lesions
  • Rheumatic nodules
  • Osler’s nodes: tender, erythematous, red-blue-purple nodules, on distal pads of fingers, associated with bacterial endocarditis or connective tissue disease
  • Xanthoma tuberosum
  • Varicose veins
  • Leg ulcers: differentiate between arterial & venous (see p. 12)
  • Ear creasing before 60
  • Aarachnodactyly: Marfan’s syndrome (CHD)

• Abdominal & Vascular Assessment (arms, legs, abdomen)
  • Ascites: shifting dullness
  • Bruits: abdominal (ARIF) carotid & temporal (auscultate before palpating)
  • Pulses: arteries
  • Pulsating aorta
  • Systemic venous congestion: dilated vessels hepatomegally or tenderness friction rub
  • Jugular venous distention: JVD by inspection JVP by measurements above 3-4 cms
  • Hepatojugular reflux: abdominal manual compression test: with patient supine & mouth open, manual pressure is applied over liver. Resulting increase in JVD is associated with right ventricular failure
  • Skin temperature: & characteristics (warmth, hair growth)
  • Edema: Pitting: fluid retention Firm, nonpitting: lymphedema
  • Deep vein thrombosis (DVT): unilateral swelling, venous distention, increased warmth, tenderness
    Homan’s sign: squeezing of affected calf or slow doriflexion of ankle produces calf pain
CARDIAC EXAMINATION

- **Precordium:** Observation & Palpation
  - **Inspect:** apical impulse, heave
  - **Palpate:** PMI, thrills, pericardial areas for thrusts or thrills
  - **Auscultate:** five pericardial areas,
    (aortic, pulmonic, Erbs, tricuspid, mitral)
    bell/diaphragm, one sound at a time

- **Non Quiet Precordium:** areas & limited examples
  - **Aortic:**
    - Sharp pulsation: HTN
    - Thrill: aortic stenosis
  - **Pulmonic:**
    - Sharp pulses: HTN
    - Thrill: pulmonic stenosis
    - Forceful: emphysema, pneumonia
  - **LLSB (Tricuspid, epigastric area):**
    - Strong pulsations or thrusts:
      - Rt. Ventricular hypertrophy
  - **Apical:**
    - Thrill: mitral stenosis
    - PMI left of MCL or below 5th ICS:
      - Cardiac enlargement

- **Auscultation**

  - **Abnormalities:** rate & rhythm

  - **Heart Sounds**
    - S1 - closure of AV valves
    - S2 - closure of SL valves
    - S2 splits
      - physiological
      - fixed
      - paradoxical
      - wide

  - **Abnormalities in S1 & S2**

    - **Diastolic extra sounds**
      - S3 - ventricular gallop (CHF)
      - S4 - atrial gallop (CAD, HTN)
      - summation sound or gallop
      - **Opening snap** - mitral stenosis

    - **Systolic extra sounds**
      - **Ejection click** – aortic or pulmonic stenosis
      - Midsystolic click – squatting may move closer to S2
• **Murmurs**
  - **Timing**: S1 or S2
  - **Duration**: early, mid, late, pan
  - **Intensity**: I – VI rating scale
  - **Pitch**: soft, high, low, harsh…
  - **Location**: near valves, where heard best
  - **Radiation**: ie, back, shoulders…
  - **Relationships**: to body position, respirations (changes in murmur)

• **Pericardial friction rub**

• **Intensity Grading of Murmurs** (I – VI)
  - I Barely audible
  - II Soft, but easily audible
  - III Louder, no thrill
  - IV Thrill, loud, audible with stethoscope
  - V Thrill, audible with stethoscope barely touching
  - VI Thrill, audible without stethoscope

**SPECIAL MANEUVERS FOR EVALUATION OF SYSTOLIC MURMURS**
**DIASTOLIC MURMURS ARE ALWAYS PATHOLOGICA**

• **Respiration**
  - **Inspiration** - venous return enhanced & right-sided murmurs may increase
  - **Expiration** - Decrease in venous return & right-sided murmurs may decrease. Left sided murmurs may increase

• **Valsalva Maneuver**
  During straining phase, venous return diminishes, left ventricular volume & BP are reduced
  Hypertrophic obstructive cardiomyopathy & mitral valve prolapse murmurs increase & aortic stenosis murmurs decrease

• **Standing from Squatting**
  Left ventricular volume is reduced secondary to reduced venous return
  Mitral valve prolapse may be enhanced & in absence of murmur may produce mitral insufficiency murmur.
  Hypertrophic obstructive cardiomyopathy murmur increases & aortic stenosis murmur decreases

• **Passive Leg Raising**
  Increased venous return & increased left ventricular & right ventricular volume
  May enhance murmur of tricuspid regurgitation
• **Handgrip**
  After one minute of patients strongest possible grip
  May reduce murmur of aortic stenosis,
  increase murmur of aortic regurgitation
  & mitral regurgitation.
  May increase murmur of VSD

• **Arterial Occlusion**
  Bilateral, upper arms, 20-40 mm hg above BP
  Intensity noted after 20 seconds
  May increase murmur of mitral regurgitation

**“Innocent” Murmurs**
  Systolic (except for venous hum)
  Common - Children, teenage & high output conditions
  Grade III or less
  Pulmonary or LLSB
  Altered by position
  Absence of cardiac enlargement
  Normal EKG or chest X-ray
  Short, Systolic, Soft
  If in doubt - echo
  Physiologic splitting of S2

• **Children - Physiologic Murmurs**
  Still's Vibratory Murmur - Systolic, LLSB & apex,
  intensifies during supination, early school age
  Venous Hum - Continuous at clavicles,
  disappears with supination, compression of jugular vein
  or turning head, early school years
  Pulmonary Flow Murmur - older children,
  LUSB, louder in supine position
  PPP -Physiologic Peripheral Pulmonic Stenosis Murmur - newborns

• **Children - Common Organic Murmurs**
  ASD
  VSD
  PDA
  Pulmonic Stenosis
  Aortic Stenosis
  Coarctation of Aorta
EXAMPLE OF COMMON ABNORMALITY:
CLINICAL PORTRAIT OF CHF
S3 - may be first sign
tachycardia, with decreased BP
cool, moist, pale skin
dyspnea with orthopnea, decreased O2 saturation
adventitious breath sounds
cough
JVD
decreased urine output
edema/ascities

• Diagnostic Evaluation
  • History & Physical Exam
  • 12 Lead EKG
    EKG changes reflection ischemia, injury & infarction
    Ischemia: Inverted T- wave
              S-T segment depression
    Injury: ST elevation
    Infarction: Significant Q-wave
  • Chest X-ray
  • Arterial Blood Gases
  • Lab Data: CBC & differential
              Electrolytes
              PT
              PPT
              Serum Lipids
    • Cardiac enzymes: Initial for acute MI
      CPK (creatine phosphokinase)
      Begins to rise in 3-6 hours:
      Peaks from 12-24 hours
      Returns to normal in 3-5 days
      LDH (lactate dehydrogenase)
      Begins to rise within 12 hours:
      Peaks from 36-72 hours
      Returns to normal within 10 days
      CK-MB (creatine kinase & it’s
      Isoenzyme
      Rises within 4-6 hours
      Peaks from 18-24 hours
      Returns to normal within 36-72 hours
  • Echocardiogram
  • Exercise Treadmill Test
  • Exercise Thallium Test
  • Cardiac Catheterization
  • Ancillary Tests: such as upper GI, abdominal sonogram,
                   acid secretion tests
Common abnormalities

Clinical portrait of CHF

- S3 - may be first sign
- tachycardia, with decreased BP
- cool, moist, pale skin
- dyspnea with orthopnea, decreased O2 saturation
- adventitious breath sounds
- cough
- JVD
- decreased urine output
- edema/ascities