Physiological Changes with Age

Cardiac Valves: stiffen, calcify, degenerate = expect murmurs ("swish")

Conduction System: coronary arteries get poor blood = necrosis, arrhythmias; lose pacemaker cells, lose conduction, fat in SA node, coming from ectopic muscle

Left Ventricle: atrophies, stiffens, enlarges, becomes less distensible, dec. SV & CO, dec. EF, most noticeable w/ physical activity

Aorta & Large Arteries: thicken, stiffen, less distensible = pumps harder (inc. HR) & inc. systemic vascular resistance

Baroreceptors: located in carotid arteries; help regulate BP; less sensitive w/ age; most noticeable w/ position changes

Framingham Heart Study (1948): *Landmark study done in Framingham, MA looking at cardiac risk and what we can do--modifiable & non-modif. risk factors*
- 5,209 subjects (mean age 47) & offsprings
- Established the CV risk profile!

Assessment: Psychosocial

Ask about...

Occupation?

Insurance?

Support system?

Pets at home?

Hobbies that may help?

* Patients won't get better if they're stressed!

Assessment: Modifiable & Non-Modif. Risk Factors

MODIFIABLE RISK FACTORS

Age: symptoms start by 40yo, unlikely to survive MI if <30yo b/c collateral circulation

Ethnicity: more prevalent in non-Hispanics, death rate higher in African Amer. (HTN)

Heredity: HTN, inc. lipids, DM, obesity

Gender: men > women until menopause, childbearing women have 25% chance, women >40yo & after menopause > men (r/t heart size & collateral circulation)

NON-MODIFIABLE RISK FACTORS

BP: biggest problem = insidious - take meds if needed

HLD: goals - **total cholesterol** < 200; **HDL** > 50, **LDL** < 70 - take meds if needed

Smoking: temp of vape = hyperplasia, asthma-like symptoms; causes 21% of CVD deaths; carcinogenic; inc. epic & norepi = heart works harder, vasoconstriction & dec. circulation, C monoxide = inc. vessel perm.

DM: r/t early atherosclerosis, inc. thickening of blood

Physical Inactivity: "new smoking", exercise inc. collateral circulation

Obesity: extra burden on heart

Personal Factors: stress, psych. response

Collateral circulation: *inc. angiogenesis; adding vessels to supply cardiac circulation*

Obese: BMI >30 / **Morbid Obese**: BMI >45
Super Morbid Obese: BMI >65

Assessment: Subjective & Objective Data

SUBJECTIVE DATA (History of Symptoms)

Chest Pain: (activity w/) onset? location? severity? type? precipitating factors? other Sx? may c/o nausea, indigestion
- Causes: *cardiac* (myocardial), *pulm.*, *m/s*

Dyspnea or SOB: often assoc. w/ left side heart pain, dec. perfusion, orthopnic

Palpitations: usually PAC, c/o rapid HR = dec. EF & CO (caffeine)

Fatigue: mild to severe, may attribute to getting older (compare to daily activity)

Extremity Pain: arm (may be R), jaw

Syncope: if issue w/ CO

Weight Gain: fluid, daily wt, anasarca

OBJECTIVE DATA

General Appearance: AAOx3?, posture
- Restlessness assoc. w/ change in O_2

Vital Signs: BP? HTN < 130/80, check BP bilat., may see a paradoxical change in BP

Heart Sounds: S_1, S_2; may hear S_3 & S_4, murmurs, clicks

Cyanosis & JVD: pallor; JVD = R-sided HF (cor pulmonale), seen w/ OSA; = give Lasix

Subjective Data: Ask for chief complaint (usually CP), PMH, current health
- Dehydrated = lose H_2O & electrolytes

Objective Data:
Pulse Pressure: *SBP - DBP; normally 30-40*
- **Closer (~20)**: r/t vasc. resistance = dec. CO & SV
- **Widened (~40)**: r/t slow HR, atherosclerosis, inc. w/ age

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Diagnostic Studies

SERUM CARDIAC ENZYMES (SERUM MARKERS) OR CARDIAC BIOMARKERS

Troponin: *GOLD STANDARD OF CP*; appears 2-4 hr after damage to myocardial muscle, inc. further depending on damage

CK-MB: r/t cardiac muscle; detected 2-4 hr after damage, elevated 72 hr max

CK-MM: r/t skeletal muscle

CK-BB: r/t brain tissue

Myoglobin: byproduct of muscle breakdown, appears in 2-4 hr, then dec.; affects kidneys; rhabdomyolysis

BNP: r/t stretch of heart; correlates + w/ HF; secreted by ventricles r/t stress

CRP: non-specific inflammatory marker; correlates + w/ atherosclerosis; good for determining severity of disease process

Myeloperoxidase: leukocyte enzyme r/t plaque instability and enzyme production

Ischemia Modified Albumin: circulating albumin touches ischemic tissues

Homocysteine: get from eating meat (in amino acids), linked to disease development

Serum Lipids: correlates + w/ intravascular plaques

COAGULATION STUDIES

Unfractionated Heparin: if elevated, give protamine sulfate

APTT

PT/INR: if elevated, give vitamin K

Why do coagulation studies? *To know if pt is anti-coagulated in case of procedure*

Antidotes

* Coumadin = vitamin K
* Many newer generation anti-coagulants don't have antidotes! = Give cryoprecipitate

More Diagnostic Studies

OTHER

EKG	shows issues r/t heart rhythm; 12-lead EKG w/ age 40yo+
Telemetry	continuously monitoring EKG, ambulatory
Holter Monitor	ambulatory type, pt takes it home & writes down what they do to compare it to the rhythm
X-Ray	shows enlargement, fluid; pulmonary edema r/t CHF?

STRESS, NUCLEAR, & ULTRASOUND TESTS

Exercise Stress Test	look at BP and HR w/ inc. exercise and inc. myocardial O_2 demand
Nuclear Perfusion Imaging	stress test & blood flow through the heart
Echocardiogram	shows wall movement, overall ventilatory performance; can tell how badly heart was damaged
TTE	2-D
TEE	3-D (better)

Serum Electrolytes & the Heart

K	**biggest electrolyte r/t heart**
	Hypokalemia: inc. electrical instability, a fib, digoxin toxicity
	Hyperkalemia: P-wave issues, bradycardia, asystole, ventricle issues; give Kayexalate, insulin (IVP 10 units) + D_{50}; give Lasix
Na	**r/t CHF**
	Hyponatremia
	Hypernatremia
Ca	*Hypocalcemia*
	Hypercalcemia
Mg	*Hypomagnesemia*
	Hypermagnesemia
P	*Hypophosphatemia*
	Hyperphosphatemia

Insulin: *K follows glucose into cells*

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