## Shock

**Definition**

Severe cardiovascular failure caused by poor blood flow or inadequate distribution of flow

**1) Hypovolemic Shock**

Hemorrhage, fluid loss, loss of plasma or electrolytes. All result in decreased intravascular volume. Caused by obvious loss or subtle third-space sequestration.

**2) Cardiogenic Shock**

MI, dysrhythmias, heart failure, valve/-septal failure, HTN, myocarditis, cardiac contusion, septum rupture, myocardiopathies

**3) Obstructive Shock**

Tension PTX, pericardial tamponade, obstructive valvular disorder, pulmonary embolism

**4) Distributive Shock (poorly regulated distribution of blood volume)**

Septic shock, SIRS (signs of systemic inflammation w/out end-organ damage), anaphylaxis, neurogenic shock

**Clinical features**

Hypotension + Tachycardia (also AMS, orthostatic changes, metabolic acidosis, insulin resistance, oliguria/anuria, peripheral hypoperfusion)

**Sign of end-organ hypoperfusion**

Cool or mottle extremities, and weak ("thready") or absent peripheral pulses

**Treatment**

1) ABCs. 2) Treat the underlying cause. 3) T-Burg maximizes brain perfusion 4) O2 + IV fluids 5) Urine output at least 0.5 mL/kg/hr 6) Cardiac monitoring and central venous pressure 7) Pressors (Dopamine, etc.) will increase GFR, contractility, HR

## ACS (Acute Coronary Syndromes)

**Definition**

Spectrum of problems ranging from unstable angina to MI

**Classified into 2 types**

ST-elevated and Non-ST-elevated events

**Most common etiology of MI**

Preexisting atherosclerotic plaque-->thrombus formation-->prolonged myocardial ischemia-->MI

**What is a common cause of death in MI patients before they can get to hospital?**

V-fib

**Clinical features**

**Chest pain (most common), sweating, anxiety, weakness, dyspnea, light-headedness, syncope, N/V, fever

**EKG changes**

Acute MI: progression from peaked T-waves-->ST-degment elevation/depression-->Q-wave-->T-wave inversions (hours-days)

**One of the most sensitive tests to quantify extent of infarction

MRI w/ gadolinium

**Treatment--all patients**

IV fluids + O2 + NO + pain management +/- benzo + anti platelet/anticoagulation + B-blockers +/- CCBs

**Treatment--ACS + STEMI**

Reperfusion interention: aspirin + clopidogrel, coronary angiography w/in 90 min, thrombolytic therapy, statin therapy

## Orthostasis/Postural Hypotension

**Definition**

>20mmHg drop in systolic pressure between supine and sitting &/or standing measurements

**Etiology**

May be related to reduced cardiac output, paroxysmal cardiac dysrhythmias, low blood volume, medications, and various metabolic and endocrine disorders

**A reversible cause of syncope and major cause of falls in this population**

Elderly

**If the cause is depleted blood volume**

then there will also be a rise in pulse of more than 15 bpm when testing orthostatics

**If there is no change in pulse accompanying the change in BP**

then consider CNS disease or peripheral neuropathies

**Labs and Treatment**

Directed at the specific cause

## Ischemic Heart Disease

**Definition**

Characterized by insufficient oxygen supply to cardiac muscle

**Etiology**

1) **Atherosclerotic narrowing (most common). 2) Constriction of coronary arteries. 3) (Rare) congenital, emboli, arteritis, dissection

**Risk Factors**

Metabolic syndrome, male, older age, smoking, FmHx, HTN, DM, low-estrogen state, abdominal obesity, inactivity, dyslipidemia, EtOH, low fruits/veggies (cocaine-->MI)

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## Ischemic Heart Disease (cont)

**Metabolic Syndrome is 3 or more of:**

abdominal obesity, Tri>150, HDL<40-men<50women, fasting sugar>110, HTN

**Clinical Features**

Angina pectoris (chest squeezing/pr-essure, can radiate, <3min.), three types:

**1) Stable Angina**

Exacerbated by physical activity, relieved by rest

**2) Prinzmetal's (Variant) Angina**

Caused by vasospasm at rest, exercise capacity preserved

**3) Unstable Angina**

Increasing pattern of pain in previously stable patients. Occurs at rest or with exertion.

**Levine's Sign**

Clenched fist over sternums and clenched teeth

**How to relieve angina**

Sublingual nitroglycerin

**EKG Findings**

Horizontal or downsloping ST-segment depression

**Treatment**

Lifestyle changes, NO, nitrates, B-blockers, CCB, Ranolazine, ASA/Clopidigrel, revascularization

## CHF

**Definition**

Clinical syndrome: dyspnea + water/-sodium retention

**Results from changes in 1+ of the following**

Contractile ability of heart muscle, preload and after load of the ventricle, and heart rate

## CHF (cont)

**Etiologies of these changes**

MI, pericardial disorders, valvular disorders, congenital abnormalities, and non cardiac causes (high-output heart failure from thyrotoxicosis or severe anemia)

**CHF adversely affects**

Left atrial pressure + cardiac output

**Clinical features of LEFT-sided failure**

Exertional dyspnea, non-productive cough, fatigue, orthopnea, PND, basilar rales, gallops, exercise intolerance

**Clinical features of RIGHT-sided failure**

Distended neck veins, hepatic congestion, nausea, dependent pitting edema, *edema + hepatomegaly, (R-sided failure often caused by L-sided failure)

**Other symptoms of CHF**

Nocturia, cold/clammy skin, hypotension, narrow pulse pressure, S3 gallop

**CXR signs**

Kerley B lines (aka interstitial edema)

**Treatment**

1) Thiazide or Loop diuretic + ACEi. 2) CCB (amlodipine). 3) Anticoagulants or antiarrhythmics 4) Pacers/difibrillators 5) Coronary revascularization/transplant

## EKG Locations

| | |
|---|---|
| Inferior | II, III, aVF |
| Posterior | V1, V2 |
| Anteroseptal | V1, V2 |
| Anterior | V1, V2, V3 |
| Anterolateral | V4, V5, V6 |

## Hypertension

**Primary HTN**

Causes 95% of cases of HTN; multifact-orial pathogenesis (genetics, salt, obesity, RAAS, NSAIDs, smoking, lack of exercise, metabolic syndrome)

**Secondary HTN**

coarc. of aorta, RAS, chronic steroids, Cushings syndrome, pregnancy, thyroid and parathyroid disease, primary hyperaldosteronism, parenchymal renal dz)

**Essential HTN is exacerbated in this population**

Males, blacks, sedentary people, smokers

**Hypertensive urgency def.**

Must bring down BP within hours

**Hypertensive emergency def.**

Must bring down BP within 1 hour to prevent end-organ damage/death

**Malignant hypertension def.**

Elevated BP + papilledema + enceph-alopathy/nephropathy. In untreated-->-progressive renal failure.

**Complications of untreated HTN**

Cardiovascular dz, cerebrovascular dz, dementia, renal dz, aortic dissection, and atherosclerotic complications

**Diagnostic criteria--essential HTN**

Systolic >140 OR Diastolic >90 on 3 diff. occasions

**Diagnostic criteria--hypertensive urgency**

Systolic >220 OR Diastolic >125

**Diagnostic criteria--hypertensive emergency**

Diastolic >130 + papilledema

## Hypertension (cont)

**Complications of hypertensive emergency**

Hypertensive encephalopathy, nephropathy, intracranial bleeding, aortic dissection, preeclampsia/eclampsia, pulmonary edema, unstable angina, MI

**Treatment--HTN**

1) DASH diet/lifestyles changes/smoking cessation. 2) Diuretics (*HCTZ). 3) Beta blockers 4) ACEi 5) ARB 6) CCB

**Treatment--HTN urgency/emergency**

Parenteral agents, but don't lower BP too fast. Use NO, B-blockers, hydrazine, loops, clonidine, nifedipine

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