

### 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, myocardio-pathies

#### 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) O<sub>2</sub> + 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-segment 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 + O<sub>2</sub> + 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)



By **ksellybelly**  
[cheatography.com/ksellybelly/](https://cheatography.com/ksellybelly/)

Published 23rd July, 2014.  
Last updated 11th May, 2016.  
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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; multifactorial 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 + encephalopathy/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



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Last updated 11th May, 2016.  
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### 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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