

S.H.O.C.K

Septic, Hypovolemic, Obstructive and
Cardiogenic Killers

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Objectives

- Define Shock
- Review patho and basic components of life
- Identify the types of shock
- Identify treatments

Shock Defined

- “Rude unhinging of the machinery of life”-

Samuel Gross, U.S. Trauma Surgeon, 1962

- “A momentary pause in the act of death”-

John Warren, U.S. Surgeon, 1895

- Inadequate tissue perfusion

Components of Life



A

Pump failure

Causes: Heart attack, trauma to heart, obstructive causes



B

Low fluid volume

Causes: Trauma to vessels or tissues, fluid loss from GI tract (vomiting/diarrhea can also lower the fluid component of blood)

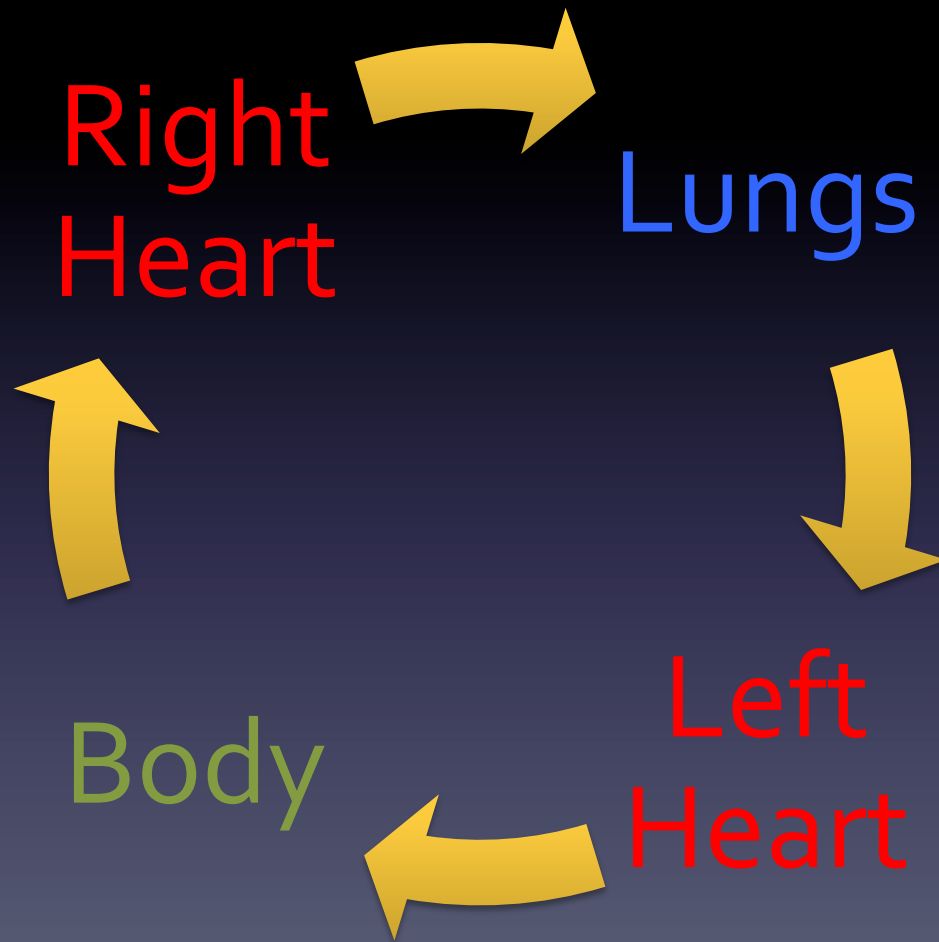


C

Poor vessel function

Causes: Infection, drug overdose (narcotic), spinal cord injury, anaphylaxis

Blood Flow



Patho Review

- Preload
- Afterload
- Baroreceptors



Perfusion Preservation

Basic rules of shock management:

- Maintain airway
- Maintain oxygenation and ventilation
- Control bleeding where possible
- Maintain circulation
 - Adequate heart rate and intravascular volume

Cases

Case 1

- 11 month old female “not acting right”
- Found in crib this am lethargic
- Airway patent
- Breathing is increased; LS clr
- Circulation- weak distal pulses; pale and cool



Case 1

- VS: RR 48, HR 140, O₂ 98%,
Cap refill >2 secs
- Foul smelling diapers x 1 day
- “I must have changed her two dozen times yesterday”
- Not eating or drinking much



Case 1

- IV established after 4 attempts
- Fluid bolus initiated
- Transported to ED
- Received 2 liters of fluid over next 24 hours



Hypovolemic Shock

Hemorrhage

Diarrhea/Vomiting

Hypovolemia

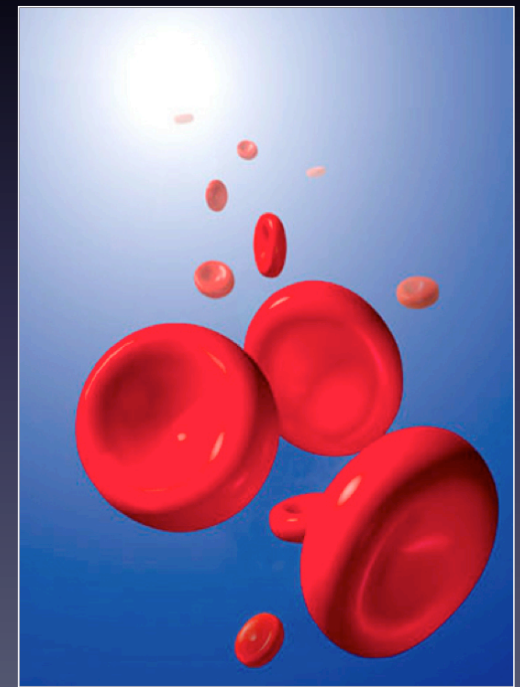
Burns

Peritonitis

Shock Progression

Compensated to decompensated

- Initial rise in blood pressure due to shunting
- Initial narrowing of pulse pressure
 - Diastolic raised more than systolic
- Prolonged hypoxia leads to worsening acidosis
- Ultimate loss of catecholamine response
- Compensated shock suddenly “crashes”



Hypovolemic Shock

Compensated progression

- Weakness and lightheadedness
- Thirst
- Pallor
- Tachycardia
- Diaphoresis
- Tachypnea
- Urinary output decreased
- Peripheral pulses weakened

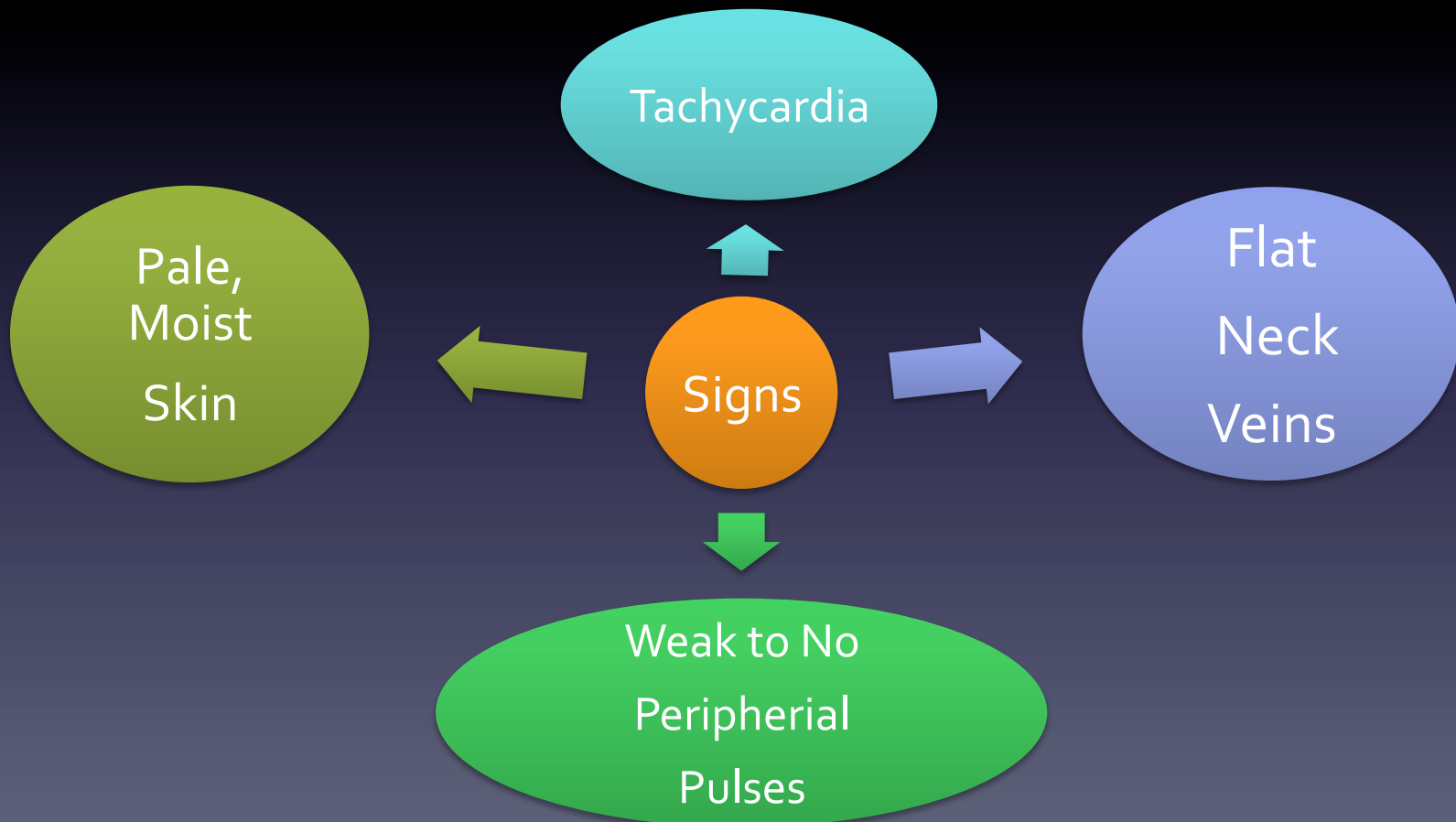


Hypovolemic Shock

Decompensated progression

- Hypotension
 - Hypovolemia and/or diminished cardiac output
- Altered mental status
 - Decreased cerebral perfusion, acidosis, hypoxia, catecholamine stimulation
- Cardiac arrest
 - Critical organ failure
 - Secondary to blood or fluid loss, hypoxia, arrhythmia

Hypovolemic Shock



Hypovolemic Shock

- Treatment
 - O₂, position, blankets
 - Fluids
 - “Wide Open”???
 - Permissive hypotension
 - Dilution of clotting factor
 - Synthetic products
 - Mast Trousers???



Case 2

- 40 year-old female with acute dyspnea
- Asthma Hx
- No relief with inhaler
- A & O x 2

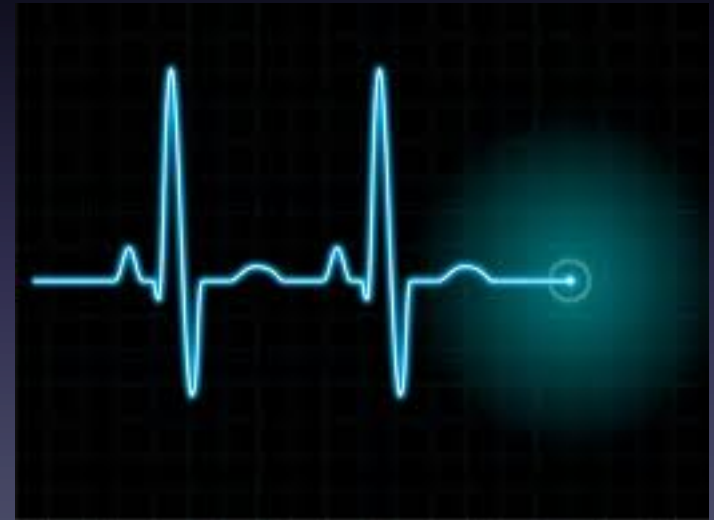


Case 2

- Airway patent
- Breathing labored; LS diminished on R
- Circulation- absent distal pulses; C/P/D
- VS: RR 30, HR 124, BP 80/60, O₂ 88%RA

Case 2

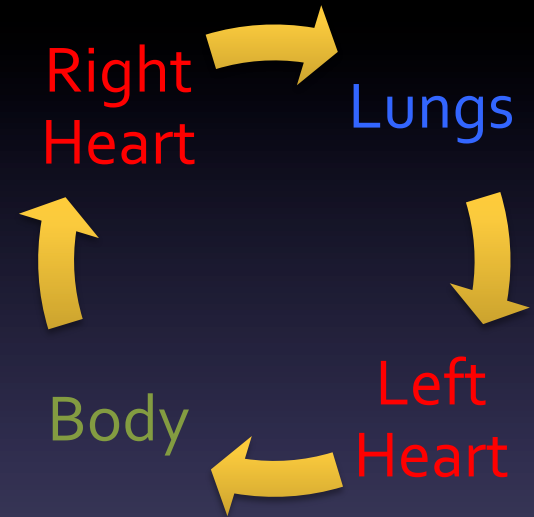
- Eyes roll back, pt becomes apneic
- No pulse detected, organized rhythm noted
- Treatment?



Obstructive Shock

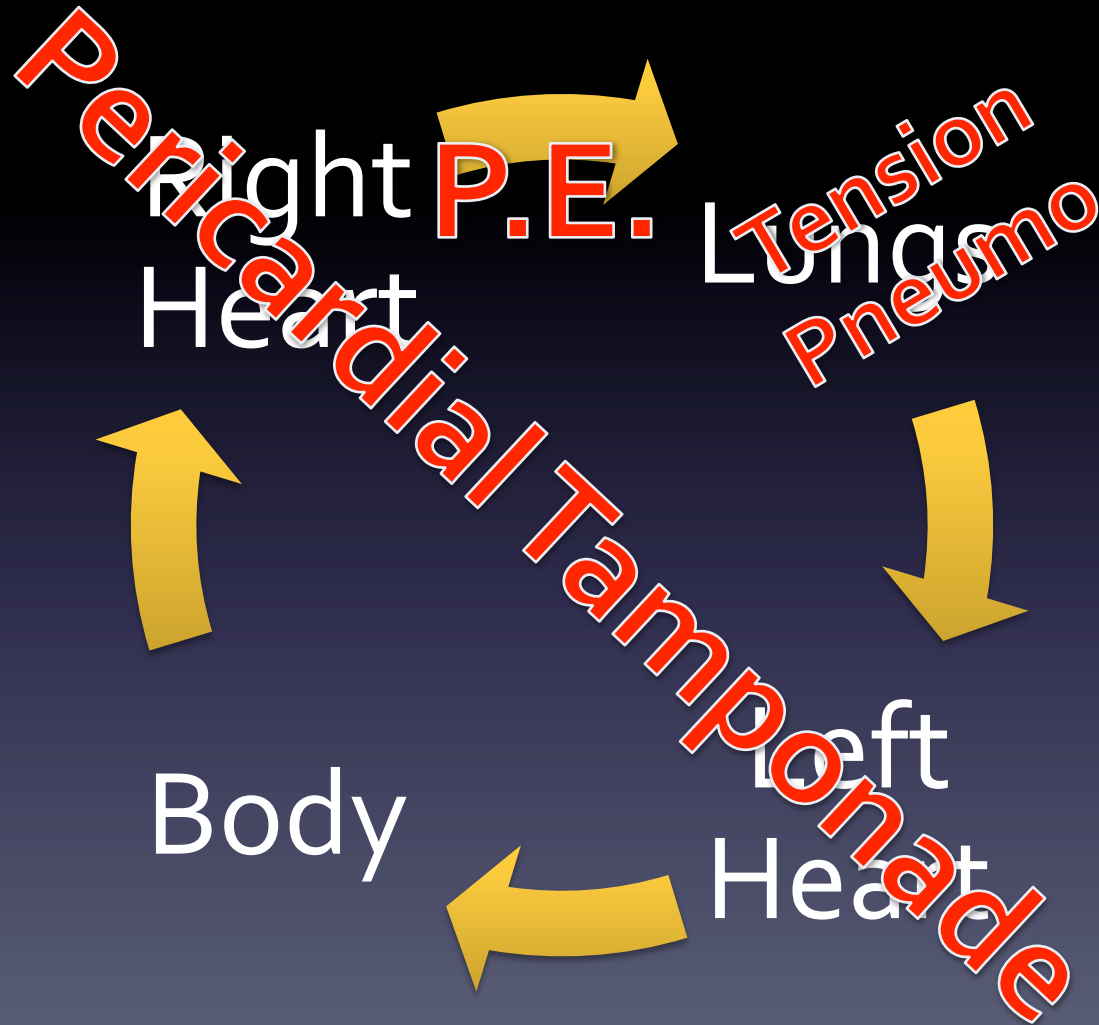
- Traumatic or Medical Causes

- Tension Pneumo
- Pericardial Tamponade
- P.E.



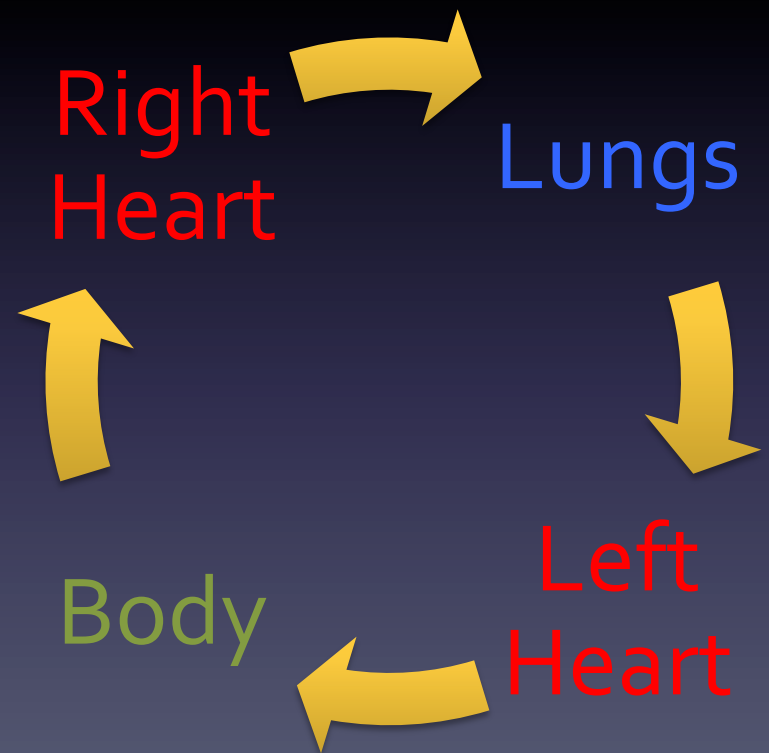
- Inhibits venous return and cardiac output

Obstructive Shock



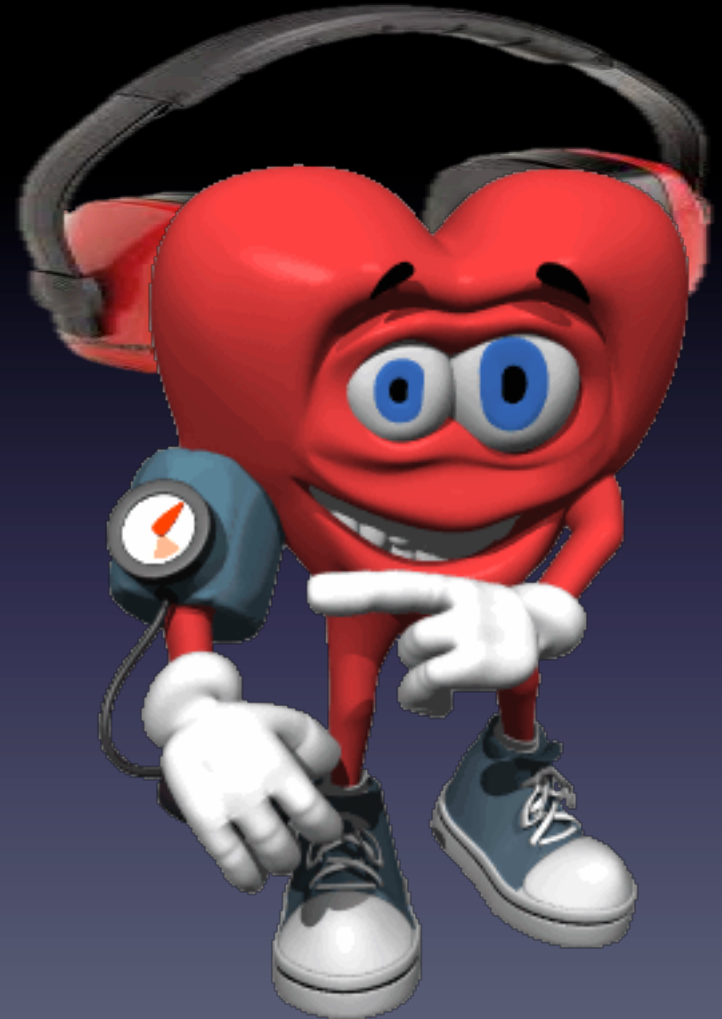
Tension Pneumothorax

- Increased Intrathoracic Pressure
 - Compromised Venous Return
 - Compromised Cardiac Output
- Signs
 - JVD
 - Absent lung sounds
 - Hypotension
 - Catecholamine Response
 - Tracheal Deviation



Pericardial Tamponade

- Fluid fills sac around heart
- Heart can't beat
- Beck's Triad
 - Muffled Heart Sounds
 - JVD
 - Narrowing Pulse Pressure



Case 3

- 56 y/o/m complaining of CP
- Woke him this a.m.
- No hx
- A & O x 4



Case 3

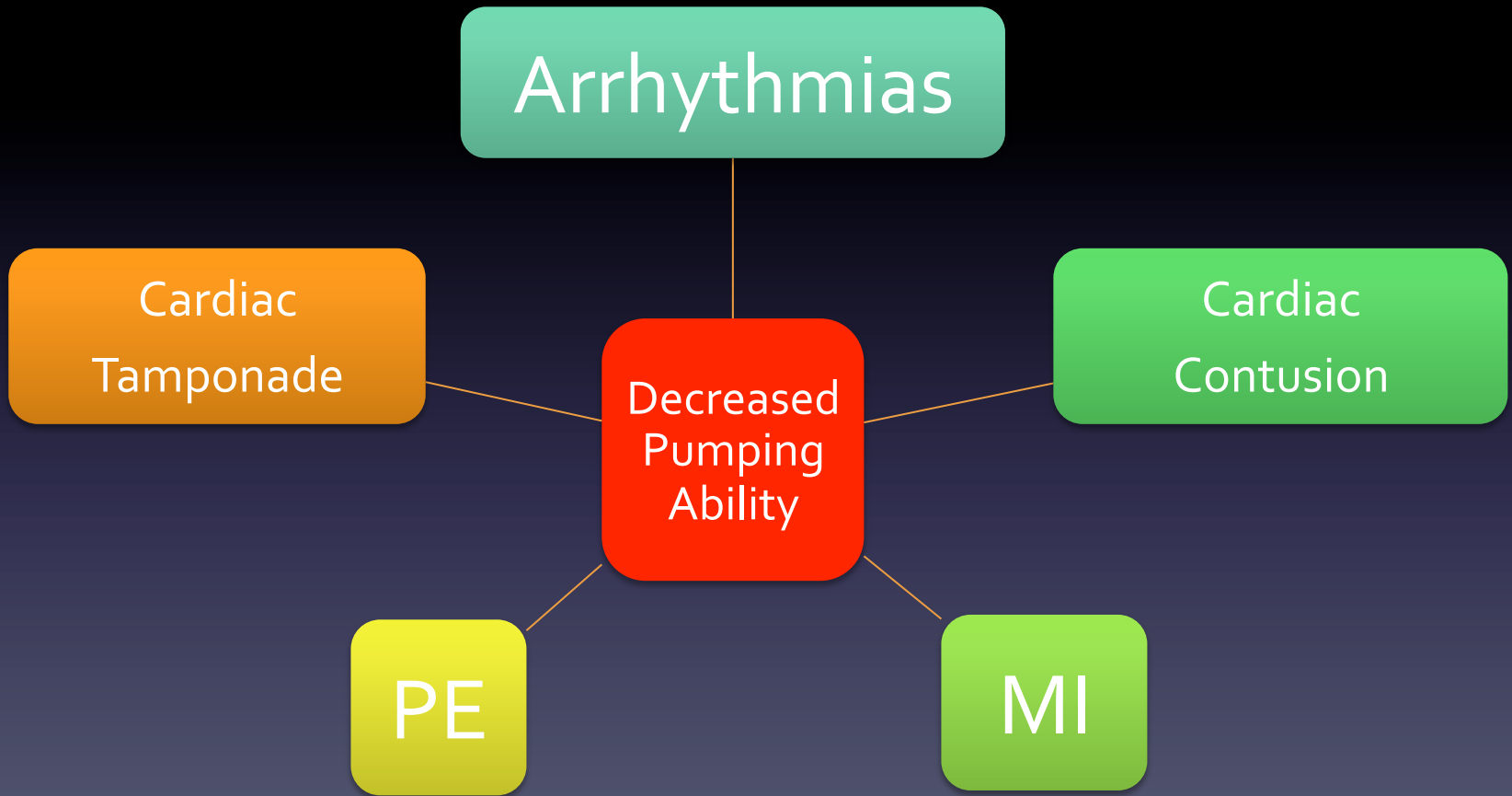
- Airway patent
- Breathing increased, LS clr
- Circulation- No distal pulses; C/D/Ashy
- VS: RR 24, HR 42, BP 80/60, O₂ 92%
- EKG Sinus Brady w/elevation in II, III, aVF

Case 3

- O₂ via NC
- ASA
- Fluids? Pressors?
- Atropine? Pace?
- $HR \times SV = CO$

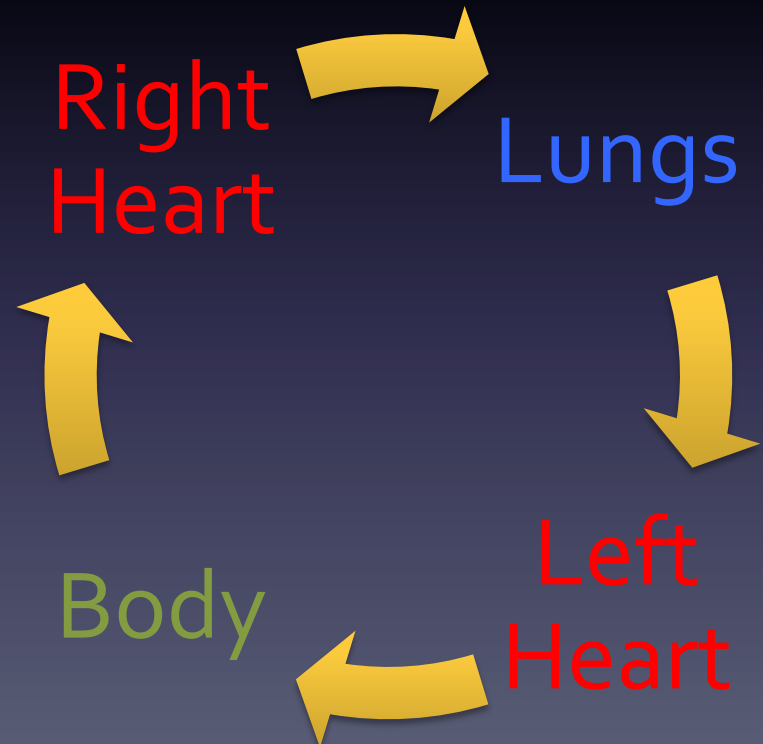


Cardiogenic Shock



Cardiogenic Shock

- Left Side (most common)
 - Pulmonary Edema
- Right side
 - JVD
 - Systemic Edema



Cardiogenic Shock

- Left Side

- O₂
- Pressors
- Need further interventions

- Right Side

- O₂
- Fluids
- Fill the tank



Case 4

- 21 y/o/m fell from 2nd floor balcony
- Unresponsive
- Lac to head, bil wrist fractures, bruising to abdomen

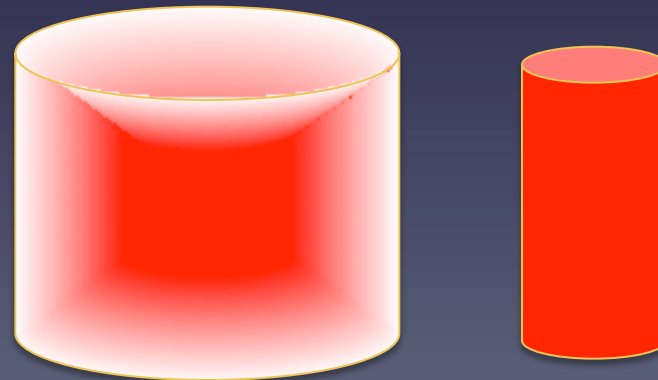


Case 4

- Airway- blood and broken teeth
- Breathing-rapid and shallow; LS diminished
- Circulation-absent distal pulses; skin warm and dry
- VS: RR 24, HR 60, BP 78/50, O₂ 96%

Neurogenic Shock

- “Vasodilatory shock”
- Sympathetic nervous system issue
- Loss of normal vasoconstriction
 - Fluid stays the same
 - Pipes get too big
 - Pressure drops



ITLS

Neurogenic Shock

- Catecholamines Blocked
 - Depends on level of injury
 - Circulating catecholamines
 - initial “boost”
 - HR normal to slow; BP low
 - Skin pink, Warm, Dry



Case 5

- 42 y/o/m stung by bees
- Sitting on bed, no distress
- No hx of allergies
- A&O x 4



Case 5

- Airway patent
- Breathing adequate; LS clear
- Circulation intact; skin redness, cool/dry
- VS: RR 20, HR 104, BP 110/70, O₂ 98%

Case 5

- Pt becomes pale and diaphoretic
- Audible wheezes
- VS: RR 24, HR 120, BP 90/60, O₂ 92%



Anaphylactic Shock

- Vasodilatory Shock due to exaggerated immune response
- Mast Cells
- Vessels “leaky”
- Vasodilation



Anaphylactic Shock

- Treatment
 - Epinephrine
 - Antihistamines
 - H₁
 - H₂
 - Fluids



Case 6

- 44 y/o/f weakness and “sick”
- Semi-fowler in bed
- Cough, chills and fever x 3 days
- A&O x2 “Just leave me alone!”



Case 6

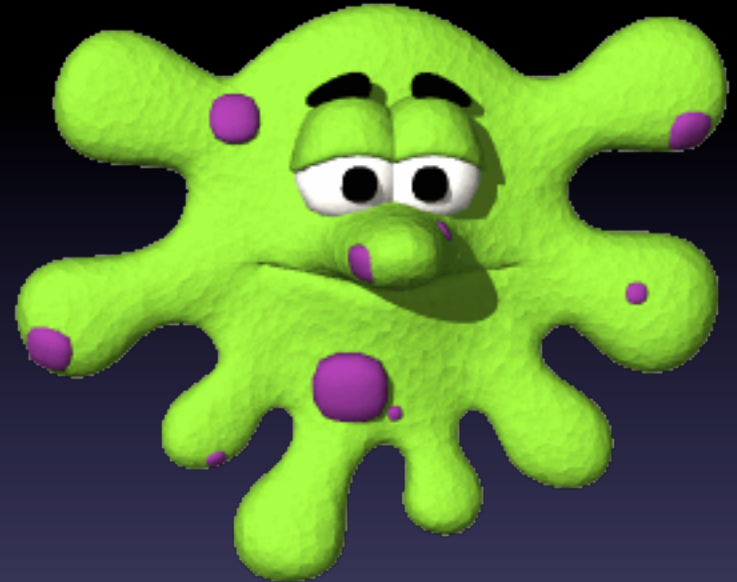
- Airway patent
- Breathing labored; rhonchi present
- Circulation- weak distal pulses, skin cool, pale and diaphoretic
- VS: RR 22, HR 118, BP 90/60, O₂ 90%

SIRS vs. Sepsis

- SIRS (Systemic Inflammatory Response Syndrome)
 - Tachypnea (RR >20; PCO₂ <32 mmHg)
 - HR > 90
 - Temp >101.3
 - Low or elevated WBC

Septic Shock

- Sepsis
 - SIRS with involved infection
- Septic Shock
 - Sepsis with hypotension, despite fluid resuscitation with evidence of inadequate tissue perfusion

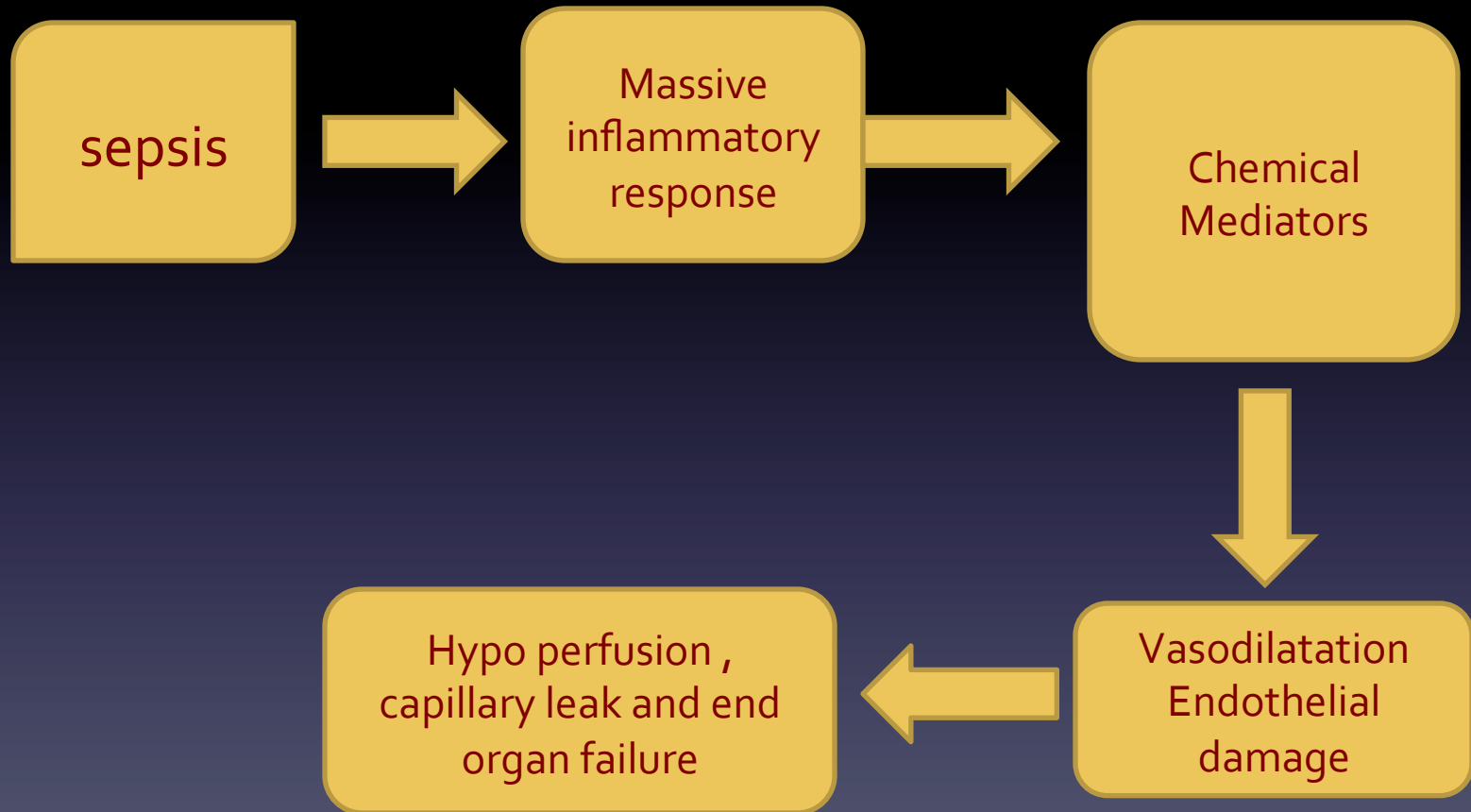


Septic Shock

- History
 - Fever
 - Chills
 - Sweating
 - Altered mental status
 - Anxiety
 - Agitation

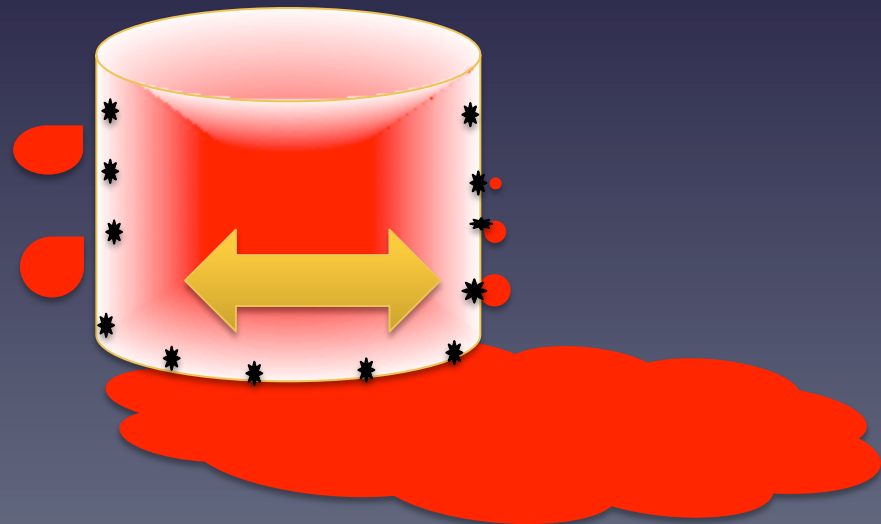


Pathophysiology



Septic Shock

- Massive vasodilation
- Increased capillary permeability
- Decreased systemic vascular resistance
- Hypotension



Septic Shock

- Treatment
 - FLUIDS, FLUIDS, FLUIDS!!!!
 - Vasopressors
 - Nor-Epi (Levophed)
 - Vasopressin
 - Dopamine



Questions?

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