Basics of Shock

Educational Reinforcement Material

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Pre-Test Questions

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    a. Systolic blood pressure < 65 mm Hg
    b. Lactic acid production due to anaerobic metabolism
    c. Metabolic supply to tissues does not meet demand
    d. When you are scared of something
2. What are the two pathways that pyruvate can take?
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    b. Increased preload
    c. Narrow pulse pressure
    d. Decreased systemic vascular resistance
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    b. Preload, contractility, and systemic vascular resistance
    c. Preload, afterload and contractility
    d. Afterload and contractility
8. Which one does not cause a decrease in preload?
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    b. Myocarditis
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9. Which one does not cause a decrease in contractility?
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    c. Epinephrine
    d. Decreased urine output
14. What is the next step if an increase in heart rate is inadequate to maintain cardiac output?
    a. More increased heart rate
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15. What is cold shock?
    a. Decrease in cardiac output
    b. Increased in systemic vascular resistance leading to bradycardia
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16. What happens to the pulse pressure in cold shock?
    a. Increases
    b. Stays the same
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    d. Depends on the cause of cold shock
17. What are the three types of cold shock?
    a. Cardiogenic, hypovolemic, obstructive
    b. Hypovolemic, septic, neurogenic
    c. Cardiogenic, obstructive, neurogenic
    d. Hypovolemic, neurogenic, septic
18. What type of shock is tamponade?
    a. Cardiogenic
    b. Obstructive
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19. What is warm shock?
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    c. Increase in afterload
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20. What happens to the pulse pressure in warm shock?
    a. Increases
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21. What is another name of warm shock?
    a. Distributive shock
    b. Sepsis
    c. Hypovolemic
22. What type of distributive shock has bradycardia?
    a. Septic
    b. Obstructive
    c. Neurogenic
    d. Cardiogenic

Shock 0045

When supply does not meet demand

The metabolic supply to tissue, and thereby organ systems, does not meet the demand

It is NOT defined by a blood pressure

_____ metabolism: Less efficient energy production, lactate production

Lactate Production 0250

Glycolysis and Pyruvate

Krebs cycle

Lactate production in normal circumstances is due to _____ oxygen supply

Lactate production in shock is due to _____ stimulation of the _____ by epinephrine leading to increased _____

Lactate production as energy source

Normally always have low levels of lactate production that is cleared by the kidneys and the liver

Causes of Hyperlactermia

- Liver Disease
- Accelerated glycolysis (increased metabolism): fever, adrenalin, hyperthyroidism, albuterol use
- Mitochondrial dysfunction (Inborn errors of metabolism)
- Thiamine deficiency (malnutrition, chronic alcoholism)
- Anaerobic metabolism (ischemic gut)
- Carbon monoxide and cyanide toxicity: alter oxidative phosphorylation
- Metformin
- Hyperventilation (alkalemia)
- Sepsis (multifactorial)

Categories of shock 0638

Cold shock 0710

- _____ stroke volume
- _____ preload, contractility
- _____ afterload
- _____ pulse pressure due to compensatory _____ and _____ in systemic vascular resistance

Warm shock

- _____ systemic vascular resistance
- Movement of blood flow from vital organs to non-vital organs (e.g. skin and muscles)
- _____ pulse pressure due to the _____ systemic vascular resistance

Stroke Volume 0829

- The amount of blood pumped out of the heart with each heartbeat

Preload:

- The volume of blood present in the ventricle at _____
- Causes for _____ in preload – hypovolemia, hemorrhage or vasodilation

Contractility:

- The strength of _____
- Causes for _____ contractility- ischemia, toxins, myocarditis, congenital heart disease

Afterload:

- _____ against the ventricular contraction
- Causes for _____ afterload- hypertensive emergency, increased vasocontraction

Defining Blood Pressures 0947

Systolic Blood pressure

- Determined by the blood volume in the arteries + aortic compliance
- Systolic Blood Pressure ~ _____

Diastolic Blood Pressure

- As the ventricle is relaxing, tissue perfusion determined by systemic vascular resistance
- Diastolic Blood Pressure ~ _____

Chronically low diastolic blood pressure, therefore an increased pulse pressure, could be associated with aortic regurgitation

Compensation for Shock 1150

_____ stroke volume->. Low cardiac output state and decreased tissue perfusion

1. Increase heart rate
2. Increase systemic vascular resistance (if heart rate is inadequate)

Determinates of vascular tone

- _____: catecholamines that cause vasoconstriction
- _____: (+) RAAS -> angiotensin II and aldosterone release

Categories of shock 1424

Cold shock:

Decrease stroke volume (i.e. decreased SBP) + increased systemic vascular resistance (i.e. increased DBP)=> narrow pulse pressure

Cardiogenic shock:

- Trouble with _____
- Examples: ischemia, congenital heart disease, toxins
- Note: increasing the systemic vascular resistance will increase the _____, thereby making it worse by further decreasing the stroke volume

Hypovolemic shock:

- Trouble with _____

- × Examples: hemorrhage, gastrointestinal losses, venodilation (most of the blood volume is in the venous vasculature) leading to relative hypovolemia

Obstructive shock (SICK):

- × Mechanism: Decreased _____/ increased _____; normal _____
- × Examples: Massive pulmonary embolism, cardiac tamponade, tension pneumothorax, HTN crisis, aortic dissection, restrictive/ constrictive pericarditis, very high positive end expiratory pressure (PEEP), abdominal compartment syndrome

Warm shock:

Distributive shock (meaning the problem is the "distribution" of blood flow)= _____ stroke volume (i.e. decreased SBP) << _____ systemic vascular resistance (i.e. decreased DBP)=> _____ pulse pressure

1. _____ - Increase in venous capacitance leading to blood pooling in the venous system
2. Increased capillary permeability - leading to loss of plasma volume into the interstitial space (so has a component of hypovolemic shock)
3. Increased heart rate + increased contractility(compensation)

- × Sepsis, _____, _____, _____
  - Sepsis - myocardial dysfunction due to cytokine release

Decreased/ normal heart rate

- × _____ shock (unopposed vagal tone)

Post Test Questions

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    c. Narrow pulse pressure
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    c. Preload, afterload and contractility
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8. Which one does not cause a decrease in preload? 0844
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9. Which one does not cause a decrease in contractility? 0905
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10. Which one does not cause increased afterload? 0927
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11. What correlates with systolic blood pressure? 0954
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