

Basics of Shock

Educational Reinforcement Material

Table of Contents

Pre-Test Questions	Page 3
Manual (blanks),.....	Page 5
Post- Test Questions	Page 8
Pre-Test Questions with answers	Page 10
Post- Test Questions with answers	Page 12

Pre-Test Questions

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 - b. Lactic acid production due to anaerobic metabolism
 - c. Metabolic supply to tissues does not meet demand
 - d. When you are scared of something
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 - c. Decreased or inadequate stroke volume
 - d. Vasoconstriction (both venous and arterial)
6. Warm shock is defined by... ?
 - a. Decreased afterload
 - b. Increased preload
 - c. Narrow pulse pressure
 - d. Decreased systemic vascular resistance
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 - a. Preload, afterload, and heart rate
 - b. Preload, contractility, and systemic vascular resistance
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10. Which one does not cause increased afterload?
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Critical Care Fundamentals: Basics of Shock

- c. Stroke volume
- d. Peripheral vascular resistance
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- 13. What is the first compensation for a decrease in stroke volume to maintain cardiac output?
 - a. Increase heart rate
 - b. Increase peripheral vascular resistance
 - c. Epinephrine
 - d. Decreased urine output
- 14. What is the next step if an increase in heart rate is inadequate to maintain cardiac output?
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 - b. Hypovolemic, septic, neurogenic
 - c. Cardiogenic, obstructive, neurogenic
 - d. Hypovolemic, neurogenic, septic
- 18. What type of shock is tamponade?
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 - b. Obstructive
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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

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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 Hyperlactemia

- × 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

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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 _____

Critical Care Fundamentals: Basics of Shock

- × 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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Critical Care Fundamentals: Basics of Shock

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 - d. Cardiogenic
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6. Warm shock is defined by...? 0742
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 - b. Increased preload
 - c. Narrow pulse pressure
 - d. Decreased systemic vascular resistance
7. What are the components of stroke volume? 0829
 - a. Preload, afterload, and heart rate
 - 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? 0844
 - a. Hemorrhage
 - b. Myocarditis
 - c. GI bleed
 - d. Vasodilation
9. Which one does not cause a decrease in contractility? 0905
 - a. Aortic stenosis
 - b. Cardiac ischemia
 - c. Myocarditis
 - d. Congenital heart disease
10. Which one does not cause increased afterload? 0927
 - a. Hypertensive emergency
 - b. Left Ventricular outflow obstruction
 - c. Increased vasodilation
 - d. Aortic stenosis
11. What correlates with systolic blood pressure? 0954
 - a. Cardiac output
 - b. End diastolic volume
 - c. Stroke volume

Critical Care Fundamentals: Basics of Shock

- d. Peripheral vascular resistance
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- 18. What type of shock is tamponade? 1850
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- 22. What type of distributive shock has bradycardia? 2602
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