

EMC 410 Trauma Management

Study Guide for Exam #3

Chapter 10. Pathophysiology of Shock

Describe the normal anatomy and physiology of the cardiovascular system.

Define shock.

What do the signs and symptoms of shock actually represent?

What are the 3 most important aspects of prehospital management of shock?

What are the 3 essential roles of the cardiovascular system?

Describe the anatomy and function of the autonomic nervous system.

What are the neurotransmitters of the autonomic nervous system and what are their effects when stimulated?

Define cardiac output.

What does pulmonary wedge pressure measure?

What are the two components of cardiac output?

What is considered to be a normal cardiac output?

What is normal stroke volume?

What are the 3 components of blood pressure?

Define systemic vascular resistance (SVR).

Define preload, afterload, and contractility and describe how they affect stroke volume.

Describe Starling's law and how it affects stroke volume.

Compare and contrast the anatomy of arteries, veins, venules, and capillaries.

What is meant by the term "capacitance vessel?"

Describe the balance between oncotic pressure and hydrostatic pressure.

What is normal total blood volume for an adult?

Define hemoglobin and hematocrit and give their normal values.

Describe how is oxygen transported to the tissues?

Describe the oxyhemoglobin curve, the factors that can shift the curve from its normal position, and the effect of these shifts on tissue oxygenation.

What are the function(s) of erythrocytes, leukocytes, and platelets?

What are the 4 factors necessary for adequate systemic oxygen delivery (These factors are incorrectly defined as the "Fick Principle" in the PHTLS text)?

Describe the relationship of these 4 factors to the prehospital management of shock.

Describe the arterial oxygen content equation and the oxygen delivery equation.

Based upon these equations, describe the factors that affect oxygen delivery.

What happens to the oxygen delivery/oxygen consumption ratio (VO_2) in the setting of shock?

How does hypoxemia affect metabolism and energy production?

Define and provide an example of the four primary etiologies of shock (respiratory failure, perfusate failure, vascular failure, and cardiac failure) and their treatments.

How much blood loss is necessary before a patient becomes hypotensive?

Describe the compensatory mechanisms of respiratory compensation, sympathetic nervous system activation, neuroendocrine response, and transcapillary refill.

What factors inherent to the patient (host factors) limit the ability to compensate for shock?

The goal of managing patients in shock is to optimize oxygen delivery, not blood pressure. How

is this accomplished?
How does crystalloid fluid boluses improve oxygen delivery in shock states? In what type of shock will massive crystalloid fluid administration be detrimental?
What role do vasopressors have in hemorrhagic shock? Why?
What is Trendelenburg's position and when should it be used?

Chapter 12. Head and Neck Trauma

Recognize that head trauma is the leading cause of traumatic death.
Who comprises the "at risk" group for head trauma?
Identify the 8 bones of the cranium.
Describe the anatomy of the meningeal layers.
Describe the falx cerebri and tentorium cerebelli.
Describe the anatomy and function of the cerebrum, cerebellum, and brainstem.
What are the 4 lobes of the cerebral hemispheres?
Describe the 3 zones of the neck.
What percentage of oxygen consumption is accounted for by the brain?
Why is the brain so vulnerable to ischemia?
Describe how the brain "autoregulates" cerebral blood flow?
How does PaCO₂ affect cerebral blood flow?
How is cerebral perfusion pressure (CPP) calculated?
What is normal ICP?
How do blood pressure and ICP affect CPP?
Describe the mechanism by which a pupil will dilate in the setting of head trauma.
Describe the function and structure of the corticospinal and spinothalamic tracts. How do they affect the clinical presentation of a head-injured patient?
Describe the coup/contrecoup injury mechanism?
Compare and contrast primary and secondary brain injury.
Describe the reticular activating system (RAS) and how it affects the clinical presentation of a head-injured patient.
Describe decorticate and decerebrate posturing. Where is the injury that produces these conditions?
Describe the Monro-Kellie principle and how it accounts for increased ICP.
Describe how the Monro-Kellie principle explains the mechanisms behind the treatment of ICP.
Define Cushing's Triad.
What is the minimum CPP necessary to prevent cerebral ischemia?
Compare and contrast uncal herniation, central herniation, and cerebellar (posterior fossa) herniation (see Fig 12-7).
How severe is blood loss from a scalp injury. Why?
Compare and contrast depressed, linear, open, and basilar skull fractures, including the signs and symptoms of each.
How can clear fluid exuding from the nose be tested for CSF?
How can blood from the ears or nose be tested for the presence of CSF?
Compare and contrast concussion, contusion, and diffuse axonal injury.
Describe the presentation, signs and symptoms, and pathophysiology of epidural hematoma.
What is the treatment for epidural hematoma.

Describe the presentation, signs and symptoms, and pathophysiology of subdural hematoma.
Describe the presentation, signs and symptoms, and pathophysiology of subarachnoid hemorrhage.

Which neck injury poses a risk for air embolus? How should it be managed?

When injured, which zone of the neck carries the highest mortality? Why?

What nerves of the neck pose a life-threat when injured? Why?

Compare and contrast upper motor neuron injuries and lower motor neuron injuries.

What special precautions should be taken when performing RSI in the head injured patient?

Discuss the role of hyperventilation in managing ICP. What is the target value for PaCO₂?

What is the role of IV fluid in the setting of head injury?

What is the role of diuretics in the setting of head injury?

Discuss the dosage and mechanism of action of Mannitol.

Ideally, in what position should a patient with a head injury be transported?

How can a cervical collar increase ICP?

Why is it important to aggressively manage seizures in the patient with head injury?

How will a patient with seizure activity present post RSI?

Why would a patient with ICP require vasopressors?

Be able to identify the level of brain injury based upon abnormal breathing patterns (fig. 12-8).

Chapter 13. Facial and Ocular Trauma

What is of primary concern in the setting of facial trauma?

What is glossoptosis and what is its significance?

What structural characteristic of the orbital floor makes it prone to injury?

Is it likely that hemorrhage from facial injuries is the source of shock in a hypotensive patient?

What infection risk does an animal bite pose? Human bite?

How should an object impaled in the cheek be managed?

Be able to differentiate the various Le Forte fractures.

What is the primary concern of Le Forte III fractures? Why?

How should epistaxis be managed in the field?

What are the signs and symptoms of TMJ dislocation? How should it be managed?

How should a tooth avulsion be managed?

Describe the anatomy of the eye.

Which cranial nerve is responsible for transmitting visual impulses to the brain?

Which cranial nerves are responsible for EOMs?

What injury may result in an unconscious patient whose contact lenses were left in place? How can we prevent this injury?

Compare and contrast alkali and acid burns to the eye? How are they treated in the field?

What is a hyphema?

What are the signs and symptoms of retinal detachment?

What is the significance of a globe rupture with loss of vitreous humor?

How should an object impaled in the eye be managed in the field?

How can you best irrigate the eyes in the field? What irrigant should be used?

How should the eyes be bandaged?

Chapter 18. Burns

What patient groups are most prone to burn injuries?

Describe the anatomy of the skin including the epidermal layers, dermal layer, and subcutaneous tissue.

What factors determine burn depth?

Describe the following 3 zones of a burn wound: hyperemia, stasis, and coagulation.

Compare and contrast 1st, 2nd, and 3rd degree burns.

In addition to burn depth, what other factors affect the severity of a burn?

Be able to estimate TBSA using the rule of nines.

How is the "rule of palm" used to estimate TBSA.

What characterizes a "major burn?"

How much irrigation is required for a burn?

Why is the burn patient at risk for hypothermia?

What should be done about clothing and jewelry that overly the burned area?

Should burned tissue be debrided?

What are the signs and symptoms of airway burns and how should they be managed?

How may chest burns affect breathing?

How reliable is pulse oximetry in the setting of burns? Why?

What are the indications for intubating a burned patient?

What is the significance of circumferential burns to the extremities?

What is the significance of burns sustained in an enclosed space?

Describe burn shock.

Describe insensible water loss secondary to burn injury.

How is cardiac output affected by burn injury?

What is the mechanism behind renal failure in the patient with burn injury?

How is the GI tract affected by burn injury?

What changes in hemoglobin and hematocrit values can be anticipated in the setting of burn injury?

Describe the pathophysiology of third spacing.

Be able to apply the Parkland Formula in calculating fluid replacement needs.

What are the signs of adequate and inadequate response to resuscitation.

What electrolyte imbalances commonly occur post burn injury?

How should pain be managed in the burn patient?

Describe the purpose and procedure for escharotomy.

What percentage of burn deaths are related to inhalation injury?

What are the 3 mechanisms of inhalation injury?

Describe the pathophysiology of carbon monoxide poisoning.

What are the signs and symptoms of carbon monoxide poisoning?

What is the field treatment for carbon monoxide poisoning?

How is hyperbaric oxygen used in the treatment of carbon monoxide poisoning?

How damaging is superheated air on respiratory mucosa?

How damaging is steam on respiratory mucosa?

What areas of the body offer the highest resistance to electrical current flow? The lowest?

Why is AC current more dangerous than DC?

Describe the 3 types of electrical injury: thermal, arc, and true electrical.

What determines the pathway of current flow?

What is the typical appearance of entrance and exit wounds?

How may electrical injury produce long bone fractures?
Describe the pathophysiology of electrical injury.
How can electrical injury result in renal failure?
Comment on this statement: “Electrical injury without visible signs of trauma usually do not require medical treatment.”
What dysrhythmias may result from electrical injury.
Describe the treatment of electrical injury.
Describe the treatment for alkali and acid burns.
Compare and contrast alpha, beta, and gamma radiation.
How may paramedics protect themselves from the effects of ionizing radiation while on the scene?

Chapter 21. Fluid Resuscitation in Trauma

Describe osmosis.
Compare and contrast crystalloid and colloid, and list examples of each type of fluid.
What are the advantages and disadvantages of crystalloid infusions in the setting of trauma?
What is hypertonic saline?
What are the advantages and disadvantages of colloid solutions?
What are some examples of colloid solutions?
What are the difficulties in using the blood substitutes in the field?
When is blood transfusion indicated?
What is hemodilution and what is its impact upon resuscitation?
Aside from hemodilution, what other complications associated with crystalloid infusion?
Compare and contrast the following intravenous access techniques: catheter over the needle, catheter through the needle, and Seldinger technique.
Describe the procedure for external jugular cannulation.
Describe the procedure for femoral vein cannulation.
What are the major blood groups?
Define and list the indications for whole blood, packed red cells, FFP, and platelets?
Compare and contrast “type and crossmatch” and “type and screen.”
What blood type can be used in an emergency when there is not sufficient time for a type and screen?
Describe autotransfusion.
What IV fluid is used in conjunction with blood administration?
What drugs can be administered through the same line as blood?
What is the purpose of the blood filter? How often should it be changed?
What is the minimum gauge of IV catheter that can be used for blood administration? Why?
What is the most common cause of blood transfusion related death?
What should you look for when inspecting a unit of blood prior to hanging it?
At what rate should blood be initially infused?
Within what time frame should a unit of blood be completely infused?
Comment on the statement: “Blood transfusion is a form of organ/tissue donation.”
Compare and contrast febrile, allergic, anaphylactic, and hemolytic reactions, including signs and symptoms and treatment.

Chapter 23. EMS Response to Hazardous Material Incidents

How does the DOT define a hazardous material?

What is SARA Title III and what does it require?

Be able to identify a hazardous material using MSDS sheets, container shape, NFPA 704 placard,

DOT placard, and shipping papers.

Compare and contrast Level A, B, C, and D protective equipment.

Describe the hot, warm, and cold zones of the hazmat scene and describe what activities take place within each zone.

How much decontamination is required before transport?

Be able to identify appropriate scene actions for a hazmat incident using the DOT guidebook.

Be able to identify appropriate treatments for chemical exposures using hazmat resource books.

Compare and contrast the 4 OSHA levels of hazmat training.

What information should be obtained by the dispatcher concerning the hazmat scene?

What “senses” may alert you to a hazardous situation?

Describe CHEMTREC and how to initiate contact.

Describe the roles of the rehab officer, hazmat officer, decontamination personnel, and medical surveillance personnel.

What is included in the pre-entry exam for rescuers working in the hot zone? What are the inclusion criteria?

List some of the challenges posed by PPE used in hazmat incidents.

Compare and contrast exposure and contamination.

Chapter 31. Air Medical Transport of the Traumatized Patient

What are some advantages and disadvantages of air medical transport?

How should EMS prepare a patient for air medical transport?

What are the minimum clearances for setting up a landing zone (LZ)?

What are the characteristics of a good LZ?

What should be avoided when setting up an LZ?

What special actions need to be taken for a night landing?

What risks does rotor wash pose to ground crews? To the aircraft?

What is the most dangerous area of the helicopter?

From what direction should you approach the helicopter?

Define Boyle’s law. Provide an example of how this law affects the trauma patient.

Define Dalton’s law. Provide an example of how this law affects the trauma patient.

Define Henry’s law. Provide an example of how this law affects the trauma patient.

Describe how the following stressors of flight affect the trauma patient and flight crew, and what steps can be taken to minimize their negative impact: barometric pressure, hypoxia, noise,

vibration, gravitational forces, thermal changes, dehydration, third spacing, and fatigue.