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What is shock?

Shock is a lethal medical condition in which your body is not getting the sufficient amount of blood it acquires. Due to the lack of nutrition and oxygen, the cells starts dying. Soon, the tissues and the organs will fail. Hence, shock is a very dangerous condition if left untreated. The symptoms of shock includes “irregular breathing, dizziness, nausea, and lackluster eyes, low blood pressure” (livescience.com).

The most common types of shock are **septic shock, anaphylactic shock, cardiogenic shock, hypovolemic shock,** and **neurogenic shock.**

What are the shocks caused by?

Septic shock is caused by a severe systemic infection (mostly by bacteria. Sometimes it's by virus, fungi, parasites, and other pathogens).

Cardiogenic shock is caused by the heart unable to pump oxygenated blood to the rest of the body inadequately.

Hypovolemic shock is the consequence of losing 20% or more of your blood or other body fluid.

Neurogenic shock is caused by severe spinal cord or brain injuries which results in the nervous system not functioning properly.

Anaphylaxis shock is caused by your immune system releasing too much chemical that may potentially hurt you. In short, it is a severe allergic reaction that cause people to go into shock.

Vocabs You Should Know Before The Lesson

Systemic Infection: An infection that spreads throughout the entire body.

Coagulation: The action of blood turns to a solid state.

Cardiac Output: The amount of blood the heart pumps through the entire circulatory system.

Angina: Chest pain

Ischemia: Lack of blood circulation.

Preload: The initial volume of blood entering the heart before contraction.

Hemorrhage: Bleeding

Sympathetic nervous system: The nervous system that is in charge of “fight or flight." Warns the body for potential danger. EX: Secreting adrenalin, tachycardia, and vessel constriction.

Parasympathetic nervous system: The opposite of sympathetic nervous system. It calms down the body. EX: lacrimation (tears), digestion, and urination.

Vocabs You Should Know Before the Lesson

Tachycardia: Heart beating too fast

Bradycardia: Heart beating too slow

Allergen: Things you are allergic to. EX: Peanut, milk, and etc.

Histamine: a chemical that is released during an allergic reaction. It causes the expansion of the expansion in the capillaries and the contraction of smooth muscles. (causes mosquito bites to be red, hot, itchy)

Septic Shock

1. A systemic infection occurs in a patient's body.
2. White blood cells are activated. And they "calls" and "recruit" other white blood cells to the infected blood vessel. White blood cells releases nitrous oxide and other molecular compounds as it travels inside the blood vessel.
3. The molecular compound causes the diameter of the blood vessel will increase its size. Which will cause the body to be hypotensive.
4. White blood cells releases enzymes attempting to destroy the pathogens. However, the blood vessels would be damage as a consequence of enzymes being released.
5. After the blood vessels are damage, the coagulation factors in the blood will try to patch up the damaged blood vessels. However, the coagulation can not keep up with the breakage of the blood vessels due to the infection being systemic. Hence, blood will spill out of the blood vessel causing disseminated intravascular coagulation (DIC).
6. To compensate, the low blood pressure, the heart increases cardiac output. Meaning the heart beats faster. However, cardiac output would be depressed if the shock is left untreated.

Causes of Cardiogenic Shock

1. ***Filling*** (Ventricles walls are enlarged and stiffer which causes less space for the blood to flow in the heart. Decrease preload and overall cardiac output)
2. ***Contraction*** (The heart becomes weaker. Contractility decreases. Decrease in cardiac output).
3. ***Structural*** (Incompetent valve that does not close all the way. This phenomenon causes the backflow of the blood).

Heart attack is the most common cause of cardiogenic shock.

Cardiogenic Shock

1. The patient will experience angina.
2. Due to the drop of the blood pressure, the heart will beat faster to increase the cardiac output. However, just like septic shock, the increase in heart rate will not be enough to improve the cardiac output.
3. Soon, the patient will be ischemic due to the lack of oxygenated blood since the heart is not pumping like it should be. The cells does not get enough oxygenated blood. Hence, the respiratory rate will increase to compensate the lack of oxygenated blood from the cells. However, cardiogenic shock is not a respiratory problem and oxygen in the lungs are sufficient.
4. If the patient is still untreated, then the patient will die from the heart failure.

Hypovolemic Shock (Hemorrhagic)

1. Some guy got “yeeted" off a roof, which caused multiple acute hemorrhaging followed by the blood lost over 20%.
2. Due to the significant blood loss, the heart will decrease in preload which causes low blood pressure. The compensation mechanism will kick in as the heart will beat faster to balance the blood pressure. However, blood pressure will continue to be low.
3. If left untreated, there will be a lack of blood to support other vital organs such as the brain and liver. Hence, organ failure would occur followed by death.

Neurogenic Shock

1. Once a person is in neurogenic shock, he loses control of his sympathetic nervous system. This will cause a series of complications such as bradycardia, hypotension, and possibly airway restriction. These symptoms are occurs due to the failure of sympathetic nervous system.
2. Since there is nothing regulating or antagonizing the parasympathetic nervous system. Hence, the blood pressure will continue to drop. If the patient is left untreated, then the drop of the blood pressure will cause permanent brain damage.

Anaphylaxis Shock

1. A person is exposed to something he is severely allergic to. The immune system overreacts are releases “a flood of chemicals” attempting to fight off the allergen.
2. The trigger of an allergic reaction forces the immune system to produce IgE antibody which is in charge of releasing chemicals such as histamine to “get rid off” the allergen.
3. The release of too much histamines may cause your blood pressure to drop suddenly and airways being narrow which will eventually cause the patient to have trouble breathing.

Quiz Time!

https://buddymeter.com/quiz.html?q=1lhdufa

Sources

https://www.livescience.com/36945-shock-causes-symptoms-treatments.html#:~:text=The%20symptoms%20of%20shock%20include,untreated%2C%20shock%20is%20usually%20fatal.

https://nursing.unboundmedicine.com/nursingcentral/view/Diseases-and-Disorders/73546/all/Cardiogenic_Shock#:~:text=There%20are%20four%20stages%20of,output%20without%20any%20clinical%20symptoms.

https://www.webmd.com/allergies/what-are-histamines

https://www.anaphylaxis.org.uk/hcp/what-is-anaphylaxis/signs-and-symptoms/#:~:text=The%20symptoms%20are%20caused%20by,allergen)%20causing%20the%20anaphylactic%20reaction.

https://www.ncbi.nlm.nih.gov/books/NBK513297/#:~:text=Hypovolemic%20shock%20occurs%20as%20a,common%20cause%20of%20hemorrhagic%20shock.

https://www.medicalnewstoday.com/articles/311549#:~:text=Septic%20shock%20is%20a%20severe,prevent%20septic%20shock%20is%20vital.

https://medlineplus.gov/ency/article/000668.htm

Meeting concluded!

Next week: COVID-19 in Hospitals and the PPE Crisis