SHOCK

(CHAPTER 28)

QUESTION 1

Describe the common consequence of all types of shock.

In medicine, **shock** refers to any kind of circulatory problem that results in a **systemic decrease** in blood flow/oxygenation to the tissues (hypoperfusion.)

Shock of any kind is a **medical emergency**, as prolonged hypoxia can cause **permanent cellular damage** or **death**.

QUESTION 2

How does the body compensate for shock?

In response to shock, the body will try to compensate by doing everything it can to deliver **more oxygen** to the tissues.

- The heart rate will increase (**tachycardia**)
- The heart will beat **harder**
- Blood vessels will **constrict** to raise BP
- The airways will **dilate** to allow more air into the lungs (**bronchodilation**)
- Urine output will **decrease** to try to maintain blood volume.

In other words, the entire cardiopulmonary system is **panicking**.

The body knows that it isn't getting enough oxygen, and it's going to try to do **everything in its power** to compensate.

QUESTION 3

Describe the progressive stages of shock.

As we mentioned, the symptoms of shock are the body's attempt to **compensate** for some underlying circulatory problem. However, that compensation often won't be enough, or the body's homeostasis will eventually be **overwhelmed**.

If the body is unable to compensate for the lack of perfusion, tissues will begin to suffer **hypoxia**, leading to a decrease in **aerobic metabolism**.

Cells switch to **anaerobic metabolism** to maintain their energy needs, leading to **metabolic acidosis** (similar to DKA, which we've talkeed about before.)

Even this may not be enough if O_2 levels are low enough, and ATP production may be impaired to the point where cells **malfunction** or **die**.

QUESTION 4

Describe obstructive shock. List some possible causes.

In **obstructive shock**, hypoperfusion is caused by an **obstruction** of either the blood vessels or the heart's ability to expand.

For example, a massive **pulmonary embolism** can block blood flow through the pulmonary vein, trapping oxygenated blood in the lungs.

Cardiac tamponade or **tension pneumothorax** can also constrict the heart, impairing its ability to fill with each stroke.

QUESTION 5

Describe hypovolemic shock. List some possible causes.

In **hypovolemic shock**, hypoperfusion is caused by a **decrease in total blood volume**.

Often, this is caused by **massive bleeding**, but can also be caused by extreme **fluid loss**, such as with severe **burns** or **dehydration**.

QUESTION 6

Describe neurogenic shock. List some possible causes.

Neurogenic shock is a type of shock caused by damage to the **central nervous system**, resulting in sudden **vasodilation** and an associated drop in BP.

Causes include **traumatic brain injury** (TBI) and **spinal cord injury** (SCI) that interfere with normal **sympathetic tone**.

QUESTION 7

Describe septic shock. List some possible causes.

Septic shock is very similar to neurogenic shock, and is also caused by **vasodilation** in the small blood vessels. However, in septic shock, the root cause is a **systemic infection**, a.k.a. **sepsis**.

The **inflammatory response** to the underlying infection triggers blood vessels to dilate throughout the entire body, drastically lowering BP.

QUESTION 8

Which types of blood pressure should be monitored in shock patients?

- Right atrial pressure
- Left atrial pressure
- Pulmonary arterial pressure

These can be estimated via echocardiogram (ultrasound,) but the best way to get an accurate reading is via **cardiac catheterization**.

QUESTION 9

Describe some complications of shock.

Eventually, with sustained hypoperfusion, **organ failure** is likely. The **kidneys** are among the first organs to be affected.

Systemic hypoxia can also lead to worsening **respiratory failure**, which only makes the situation worse.

QUESTION 10

What is multiple organ dysfunction syndrome (MODS?)

MODS is a poorly-understood progression of **severe** septic shock, in which tissue damage begins to affect many organs throughout the body, leading to **organ failure**.

It can affect the lungs, liver, GI tract, and kidneys, with the mortality rate increasing as more organs become involved.