Shock

It is a sudden drop in BP leading to decrease cardiac output and decrease tissue perfusion.

Symptoms and signs:

Patient may or may not be conscious with:

- **↑ HR, (Thready pulse), ↓ BP, Skin cool or hot and flushed, pallor, oliguria, thirst, weakness,**
- **↑ respiratory rate, cyanosis.**

Types of Shock

- Hypovolemic
- Septic
- Cardiogenic
- Anaphylactic
- Neurogenic
- Obstructive

Hypovolemic Shock

1- Non-hemorrhagic causes:

- Vomiting
- Diarrhea
- Bowel obstruction, pancreatitis
- Burns
- Neglect, environmental (dehydration)

2- Hemorrhagic causes:

- GI bleed
- Trauma
- Massive hemoptysis
- Abdominal aortic aneurysm rupture
- Ectopic pregnancy, post-partum bleeding

Classification of Shock

Hypovolemic shock:

Direct loss of effective circulating blood volume leading to:

1- Anxiety, restlessness, altered mental state due to decreased cerebral perfusion and hypoxia.

2- Hypotension due to decrease in blood volume.

3- A rapid, weak, thready pulse due to decreased blood flow combined with tachycardia.

4- Cool, moist skin due to ↑ sympathetic stimulation.

5- Rapid and shallow respiration due to sympathetic stimulation and acidosis.

6- Hypothermia due to decreased perfusion and evaporation of sweat.

7- Thirst and dry mouth, due to fluid depletion.

8- Fatigue due to inadequate oxygenation.

9- Distracted look in the eyes or staring into space, often with pupils dilated.

What Type of Shock is This?

- 68 year male with history of hypertension and diabetes mellitus presents to the emergency clinic with abrupt onset of diffuse abdominal pain with radiation to his low back. The patient is hypotensive, tachycardic, afebrile, with cool but dry skin

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Hypovolemic Shock

Cardiogenic Shock

Signs:

- Cool, moist skin
- Tachypnea
- Hypotension
- Altered mental status
- Narrowed (low) pulse pressure
- Rales, murmur

some causes of cardiogenic shock?

- Acute myocardial infarction
- Sepsis
- Myocarditis
- Myocardial contusion
- Aortic or mitral stenosis
- Acute aortic insufficiency

What Type of Shock is This?

- A 55 year old male with history of hypertension, and diadetes mellitus presents with "crushing" substernal central pain, diaphoresis, hypotension, tachycardia and cool, moist extremities

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Cardiogenic

Causes of septic shock:

Due to bacterial infection widely disseminated to many areas of the body leading to dangerously low blood pressure as a result of sepsis.

Occurs through the action of endotoxin.

Endotoxin activates nitric oxide synthetase, producing nitric oxide .

nitric oxide causes vasodilation.

Treat with drugs that inhibit the production of nitric oxide.

Septic Shock

- **Clinical signs:**
  - Hyperthermia or hypothermia
  - Tachycardia
  - Wide pulse pressure
  - Low blood pressure (SBP<90 mmHg)
  - Mental status changes
  - Beware of compensated shock!
    Blood pressure may be "normal"

What Type of Shock is This?

An 81 year old female resident of a nursing home presents to the emergency clinic with altered mental status. She is febrile to 39.4, hypotensive with a widened pulse pressure, tachycardic, with warm extremities

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Septic

Causes of anaphylactic shock:

It is an allergic condition in which the cardiac Output and arterial BP decrease drastically.

Basophils and **mast** cells release histamine which causes:

1- Venous dilation → ↓Venous return.
2- Dilation of the arterioles → ↓ arterial BP.
3- Increased capillary permeability → rapid loss of fluid and protein into the interstitial spaces → ↓venous return.

Symptoms of anaphylaxis

- **First:**
- **Pruritus, flushing,**

- **Next:**

  Throat fullness, anxiety, chest tightness, shortness of breath and lightheadedness

- **Finally:**

  Altered mental status, respiratory distress and circulatory collapse

What Type of Shock is This?

- A 34 year old female presents to the emergency clinic after dining at a restaurant where shortly after eating the first few bites of her meal, became anxious, diaphoretic, began wheezing, noted diffuse pruritic rash, nausea, and a sensation of her "throat closing off". She is currently hypotensive, tachycardic and ill appearing.

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Anaphalactic

Neurogenic Shock

- Occurs after acute spinal cord injury

- Sympathetic outflow is disrupted leaving unopposed vagal tone

- Results in hypotension and bradycardia

- Loss of sympathetic tone results in warm and dry skin

Causes of neurogenic shock:

1- Acute spinal cord injury

2- Deep general anesthesia depresses the vasomotor center → neurogenic shock.

3- Spinal anesthesia blocks the sympathetic nervous system → neurogenic shock.

4- Brain damage can be a cause of vasomotor paralysis.

What This Type of Shock?

A 41 year old male presents to the emergency clinic after a car accident complaining of decreased sensation below his waist and is now hypotensive, bradycardic, with warm extremities

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- Obstructive

Neurogenic

Obstructive Shock

- **1- Tension pneumothorax**

  - Air trapped in pleural space air/pressure
  - builds up

  - Mediastinum shifted impeding venous return

  - Chest pain, decreased breath sounds

  - Rx: Needle decompression, chest tube

Obstructive Shock

2- Cardiac tamponade

- Blood in pericardial sac prevents venous return and contraction of the heart

3- Pulmonary embolism

- Aortic stenosis

Resistance to systolic ejection causes decreased cardiac function

What Type of Shock is This?

A 24 year old male presents to the emergency clinic after a car accident complaining of chest pain and difficulty in breathing.

On examination the patient is tachycardic, hypotensive, hypoxic, and with decreased breath sounds on the left side.

Obstructive

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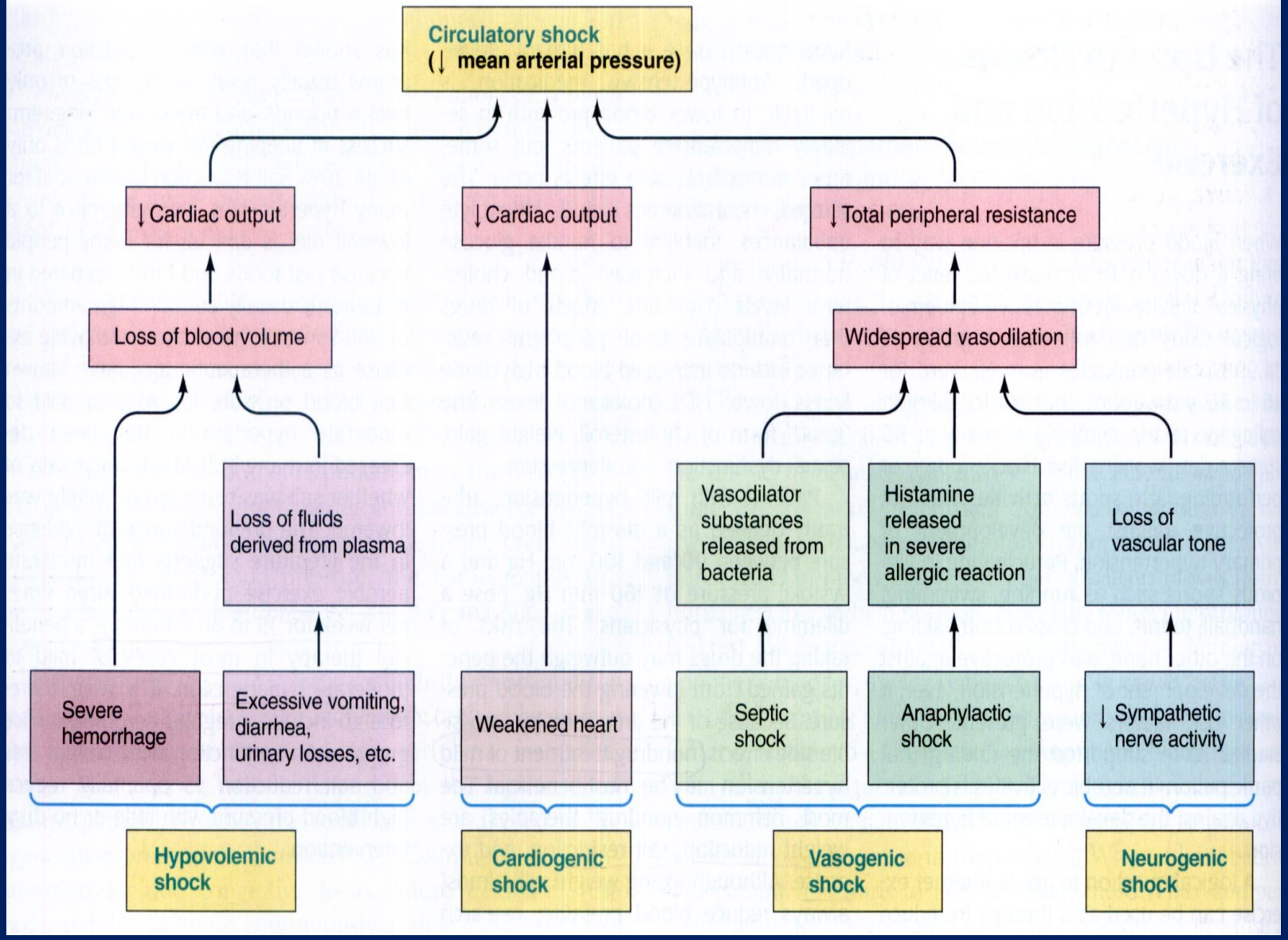
Causes of shock



Stages of Shock

Stage 1 :

Compensated Non-progressive Shock:

A- Decrease in BP → Increase sympathetic responses.

1- Skin vasoconstriction.

2- Vasoconstriction to the kidneys → ↓urine output and ↑renin secretion → ↑(Angiotensin II vasoconstrictor) and ↑(Aldosterone → ↑Na reabsorbtion and H_2O retention).

3- Release of epinephrine and nor-epinephrine.

4- Increase heart rate and force of contraction.

B- Hypoxia.

Stage 2:

Decompensated Progressive Shock.

Loss of more than 30% of blood volume and the deterioration of the CVS.

A- Decrease of mean BP below 60 mmHg. Leads to myocardial ischemia, and a decrease in C.O. → More ↓ in BP.

B- Intravascular clotting:- ↓ in blood volume → ↓in blood velocity → ↑ Viscosity.

Platelets aggregate → Clot formation → Obstruction.

C- Cellular destruction caused by lysosomal rupture and ↓activity of mitochondria → ↓ active transport and general metabolism.

D- Build up of lactic acid → Acidosis.

Stage 3:

Irreversible Shock.

Heart deteriorates until it can no longer pump blood, and death occur.