# Shock

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# What we will cover

- Definition of shock
- Causes of shock
- Clinical features of a patient with shock
- Initiating early treatment of the shocked patient
- Questions

# Definition

- What is shock?

*Acute circulatory failure, with inadequate tissue perfusion, causing cellular hypoxia*

# Causes

Preload

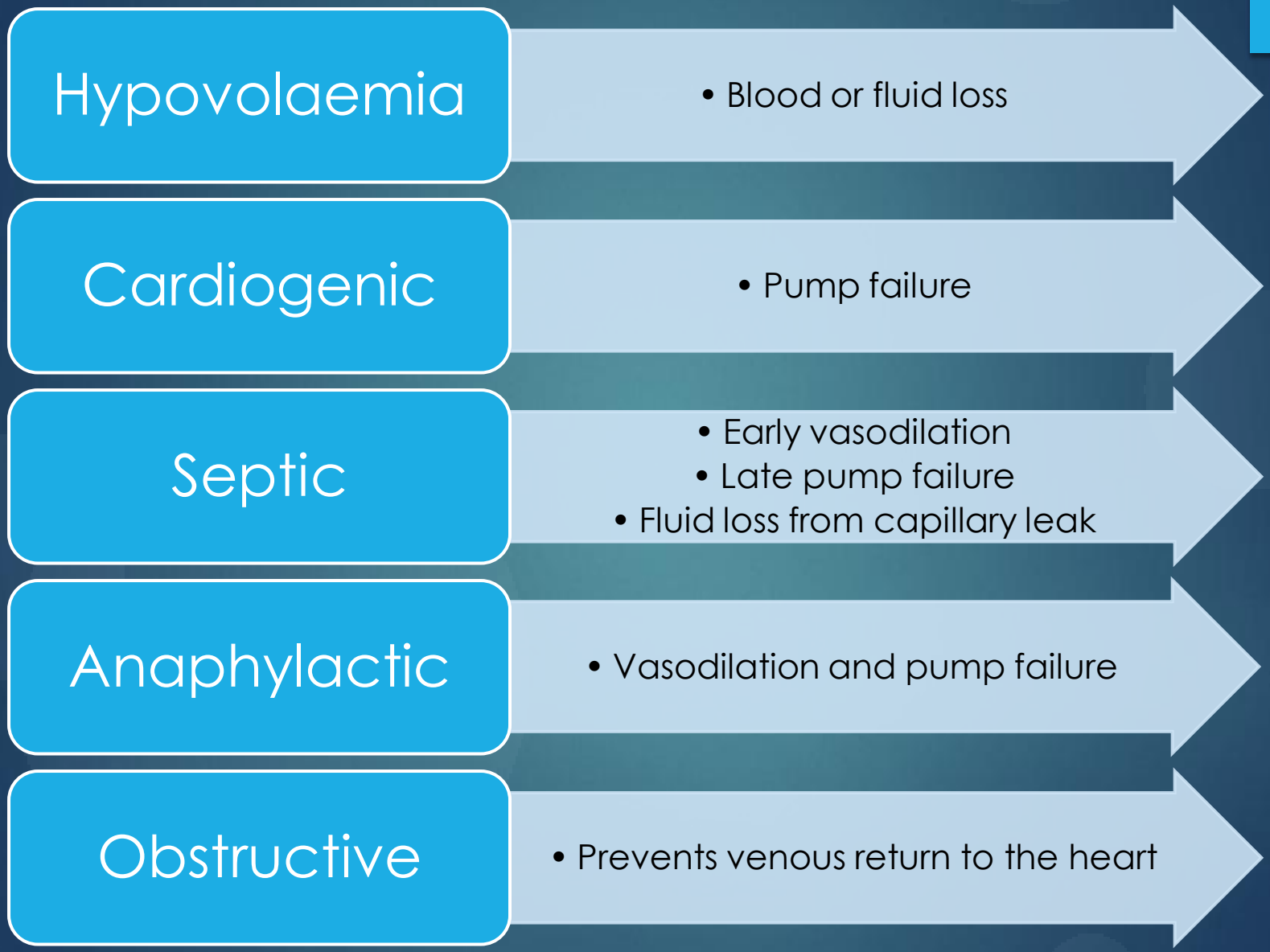

Afterload

**Hypovolaemia**
Haemorrhage
Fluid loss
Dehydration

**Cardiogenic**
MI, CCF, arrythmia

**Obstructive**
PE, tamponade, pneumothorax

**Vasodilatory**
Sepsis
Neurogenic
Anaphylactic
Adrenal insufficiency


Hypovolaemia
• Blood or fluid loss
Cardiogenic
• Pump failure
Septic
• Early vasodilation
• Late pump failure
• Fluid loss from capillary leak
Anaphylactic
• Vasodilation and pump failure
Obstructive
• Prevents venous return to the heart

# Types of shock: HYPOVOLAEMIC

- Hypovolaemia is commonest cause of shock in the surgical patient
- Low cardiac output → direct result of reduced venous return (preload)
- Common cause of hypovolaemic shock – *haemorrhage*
  - *Effcts vary with duration and severity of blood loss*
  - *Patients age and myocardial condition important*
  - *Speed and adequacy of resuscitation*

# Types of shock: HYPOVOLAEMIC

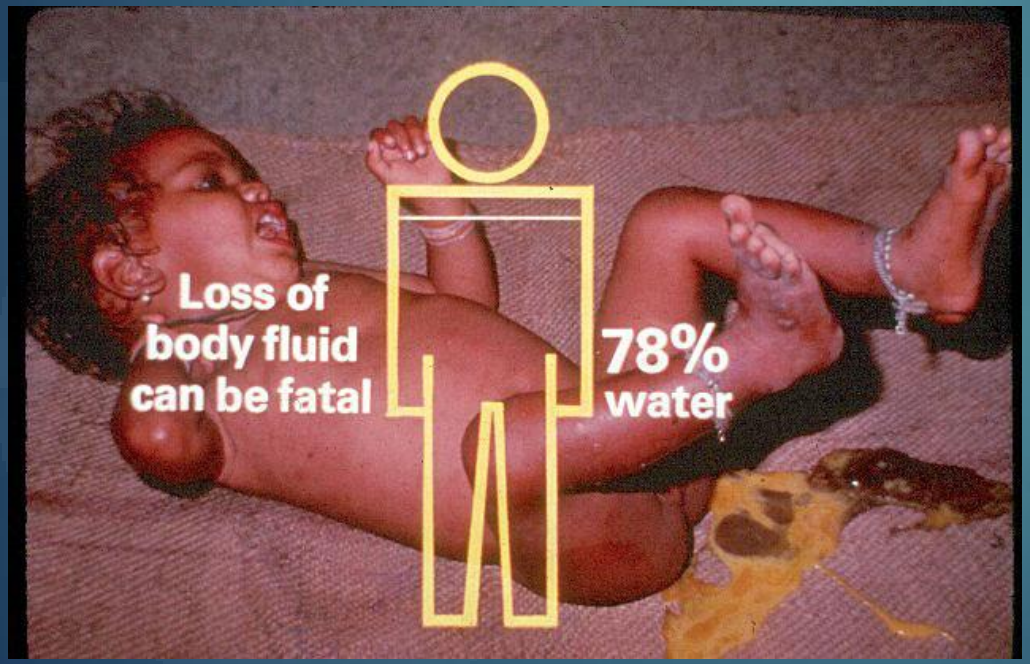
| Degree of blood loss | |
|---|---|
| Stage 1 | <500ml |
| Stage 2 | 500-1000ml |
| Stage 3 | 1000-2000ml |
| Stage 4 | >2000ml |

# Hypovolaemic shock

CAUSES

- Haemorrhage

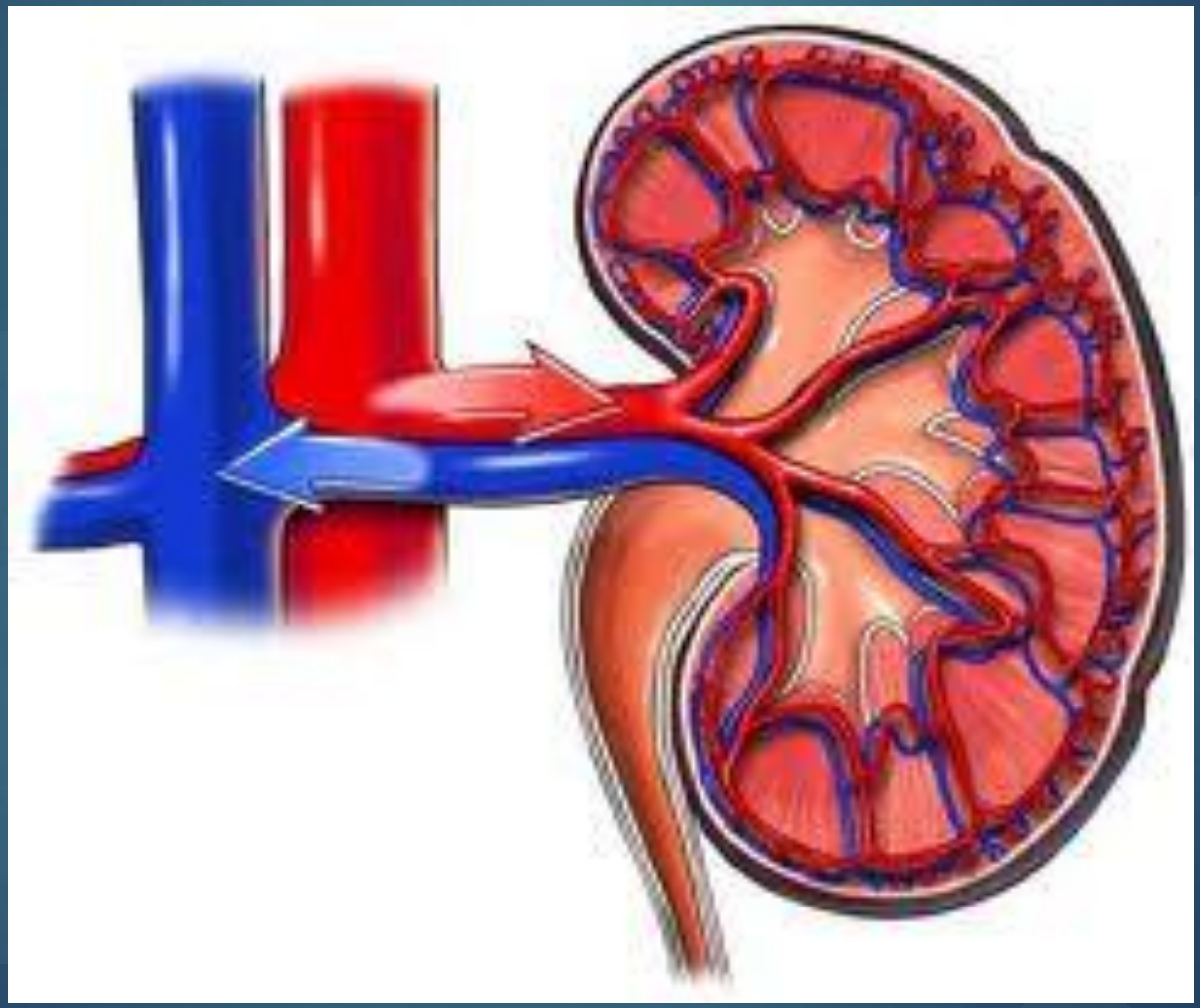
- Loss of gastro-intestinal fluid




- Trauma and infection

- Burns

- Renal loss of water and electrolytes



- Iatrogenic factors e.g. poor fluid prescription, slow or tissued i.v infusion

# Assessment

- Systematic approach
- Important features:
  - Is there an obvious cause which requires immediate treatment
  - Does the age or previous history of a patient suggest a possible myocardial component
  - Has patient recently received medication which may have had an effect on the cardiovascular or respiratory systems
  - Fluid balance – what is their urine output like?
  - Does the patient have a high temperature or high white cell count?

# Tips

- No single sign or value is diagnostic of shock
- Must look at the whole patient
- Refer to all the vital signs (pulse, BP, temperature, respiratory rate, oxygen saturations)
- Assess the physical signs of shock

# Signs of decreased tissue perfusion

- COOL PERIPHERIES
- POOR FILLING OF PERIPHERAL VEINS
- INCREASED RESPIRATORY RATE
- INCREASED CORE PERIHERAL TEMPERATURE
- CAPILLARY REFILL TIME PROLONGED (>2SECS)
- POOR URINE OUTPUT (<0.5ML/KG BODY WEIGHT/H
- RESTLESSNESS OR DECREASED CONSCIOUS LEVEL

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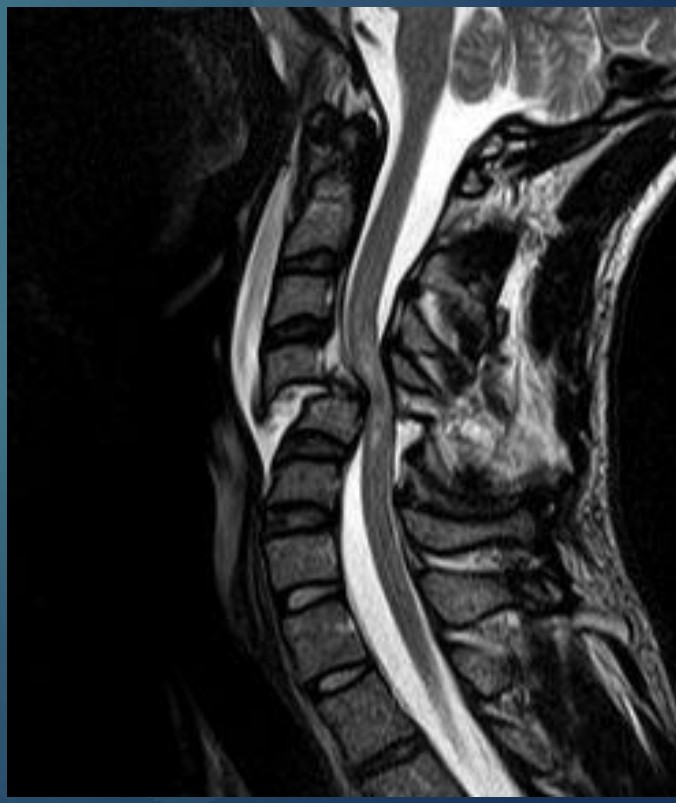
# Types of shock: CARDIOGENIC

- Primary impairment of cardiac function
- May result from:
  - MI
  - Ischaemia
  - Arrythmias
  - Acute cardiomyopathy
  - Acute valvular lesions
  - Myocardial contusions

# Types of shock: NEUROGENIC

- Following spinal transection or brain-stem injury
- loss of sympathetic outflow beneath the level of injury
- Consequent vasodilation
- Associated with relative **bradycardia**



# Types of shock: OBSTRUCTIVE

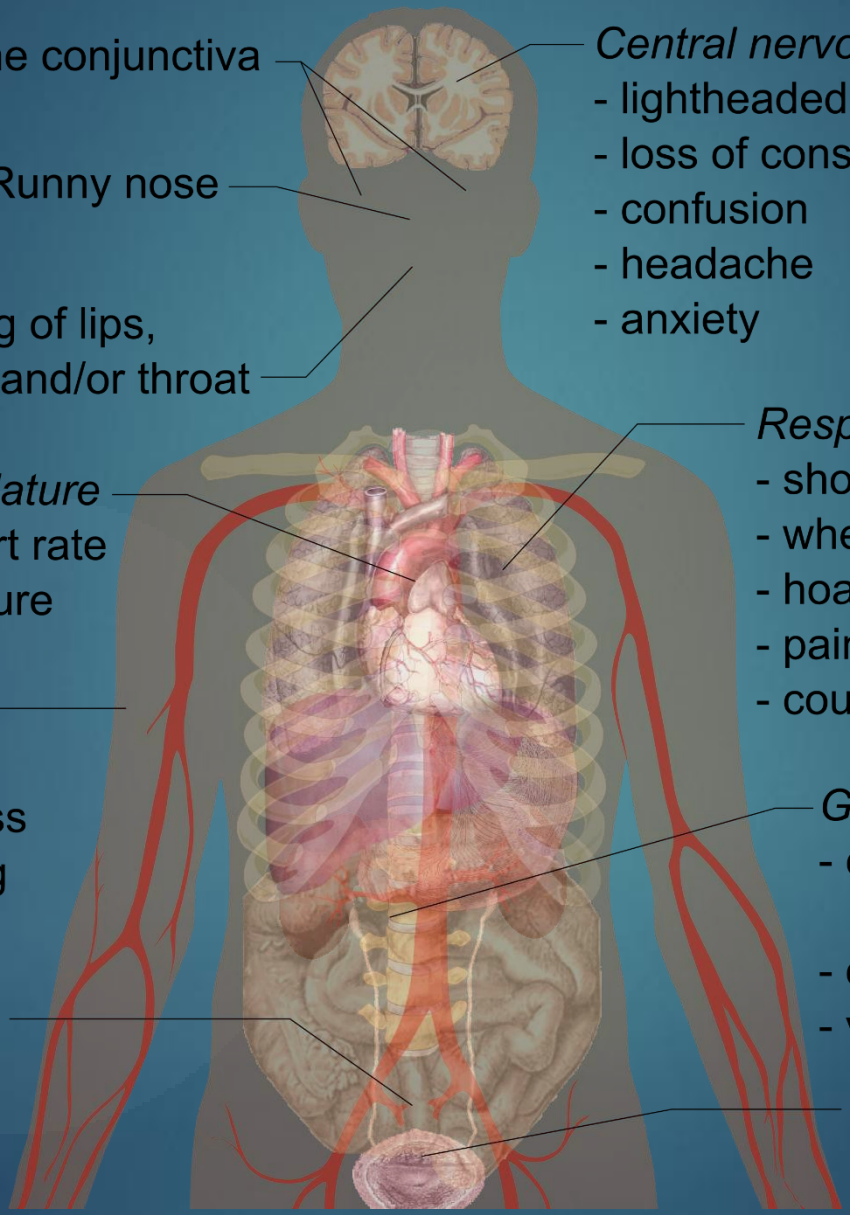
- Secondary impairment to cardiac function can result from obstruction to cardiac output
- Causes:
  - Cardiac tamponade → constriction of the heart
  - Tension pneumothorax/massive PE → obstruction to right ventricular flow
- In all shock states, myocardial performance is affected adversely by reduced coronary arterial perfusion

# Types of shock: ANAPHYLACTIC

- Mediated by IgE antibodies causing massive degranulation of mast cells in sensitised individuals
- Activation of mast cells → histatmine/serotonin → systemic kinin activation → rapid vasodilation → fall in SVR, hypotension, severe bronchospasm with hypoxia and hypercarbia
- Requires prompt treatment with:
  - Oxygen
  - Fluids
  - Adrenaline
  - Hydrocortisone
  - Anthistamine
  - Avoidance of the trigger!

Signs and symptoms of

# Anaphylaxis



Swelling of the conjunctiva

Runny nose

Swelling of lips, tongue and/or throat

*Central nervous system*
- lightheadedness
- loss of consciousness
- confusion
- headache
- anxiety

*Heart and vasculature*
- fast or slow heart rate
- low blood pressure

*Respiratory*
- shortness of breath
- wheezes or stridor
- hoarseness
- pain with swallowing
- cough

*Skin*
- hives
- itchiness
- flushing

*Gastrointestinal*
- crampy abdominal pain
- diarrhea
- vomiting

Pelvic pain

Loss of bladder control

# ANAPHYLAXIS

# Types of shock: SEPTIC

- Toxins/inflammatory mediators cause circulatory collapse and inadequate tissue perfusion
- Common sources:
  - Abdomen
  - Chest
  - Soft tissues
  - Wounds
  - Urine
  - Intravascular lines (central/peripheral)
  - Medical implants

# Clinical features of sepsis

| EARLY | LATE |
|---|---|
| Restlessness and slight confusion | Decreased level of consciousness |
| Tachypnoea | Tachypnoea |
| Tachycardia | Tachycardia |
| Low SVR | |
| High cardiac output | Low cardiac output |
| Systolic BP normal or slightly decreased | Systolic BP less than 80mmHg |
| Oliguria | Oliguria |
| Metabolic acidosis, elevated blood lactate | Metabolic acidosis, elevated blood lactate |
| Warm, dry suffused extremities | Cold extremities |

# Principles of management of shock (of any cause)

- Essential principles are

1. Resuscitate
2. Diagnose
3. Treat underlying cause

# Principles of management of shock (of any cause)

- Monitoring and instrumentation
  - Venous access
  - Urinary catheterisation
  - ECG monitoring
  - Pulse oximetry
  - CVC
- Core temperature monitoring
- Fluid administration


# STAY CALM

# Summary SHOCK

- Definition
  - Acute circulatory failure, with inadequate tissue perfusion causing cellular hypoxia
- Diagnosis
  - Assess perfusion and not simply blood pressure
  - Identify common patterns
- Treatment
  - Restore perfusion
  - Initial approach (fluids/oxygen)
  - Treat underlying cause

# Questions?