

Week 2 Revision:

Topic: SIRS and Shock

Hurdle: Peripheral and Central Venous Catheter (CVC)

Central Venous Catheters (CVC):

- A central venous catheter, also called a central line, is a long, thin, flexible tube used to give medicines, fluids, nutrients, or blood products over a long period of time, usually several weeks or more. A catheter is often inserted in the arm or chest through the skin into a large vein.
- Removed when Dr ordered, remove appropriately to reduce the occurrence of air embolism, haemorrhage, cath fracture, dislodgement or thrombus. Ask for clotting factors prior to removal, if infection send cath tip for culture.
- Pt supine for removal. Fowlers = increased risk of air embolism, O₂ pulled into site, apply pressure. Remain supine to maintain intrathoracic pressure and allow tissue tract to heal.

Assessment of a patient with CVC:

- Assess site – inflammation, crusting, ooze, blood, puss, discomfort
- Assess patency - blockage
- Assess patient education on CVC

What is SIRS:

- Systemic Inflammatory Response syndrome
- SIRS is nonspecific and can be caused by ischemia, inflammation, trauma, infection, or several insults combined. Thus, SIRS is not always related to infection
- Widespread unregulated immune response to an insult that may be infectious (shock) or non-infectious (trauma/surgery) defined by 2 or more characteristics:
 - T >38 or <36
 - HR >98 or <120-140
 - RR >20
 - PaCO₂ <32mmHg
 - WBC >12000ul or <4000ul or >10% immature bands
- Insult or injury results in pro-inflammatory and anti-inflammatory mediators.
- In SIRS, regulation of mediators are lost, resulting in local inflammatory mediator release in uncontrolled environment causing widespread vasodilation and increased vascular permeability leading to the maldistribution of circulating blood volume (3rd spacing of fluid).
- An imbalance of O₂ supply and demand follows leading to hypoperfusion of tissues.
- Cascade of events and infection = sepsis.

Sepsis:

- SIRS is reclassified as sepsis when a confirmed/suspected infection.
- Sepsis = increased risk of clinical deterioration and mortality.
- Sepsis occurs when chemicals released into the bloodstream to fight the infection trigger inflammatory response causing inflammation throughout the entire body instead of locally. Severe cases of sepsis can lead to septic shock, which is a medical emergency

Insult/injury → Release of Inflamm mediators → Vasodilation/increased vasc permeability → Maldistribution of BF/Vol. → Imbalance in O₂ supply and demand → Hypoperfusion of tissue → Ischaemic injury.

Signs and Symptoms of Sepsis:

- Tachypnoea
- Tachycardia
- Febrile >38C
- Fatigue
- Hypothermia
- Metabolic Acidosis
- Acute oliguria

Metabolic acidosis is a condition that occurs when the body produces excessive quantities of acid or when the kidneys are not removing enough acid from the body

Types of Shock:

- Distributive
 - 1) Septic – most common
 - 2) Neurogenic – insult or injury to spinal cord or brain
 - 3) Anaphylactic – severe allergic reaction
- Hypovolemic – reduced intravascular volume, reduced preload, reduced CO.
- Cardiogenic – cardiac pump failure resulting in decreased CO.

Shock:

- Septic shock is defined as cellular/tissue hypoxia due to decreased O₂ delivery and increased O₂ consumption. Usually evidenced by hypotension – circulatory failure.
- Inadequate perfusion or inadequate BF to bodily tissues, can lead to decreased cellular function and ultimately cell death, caused when any part of CVS fails.
- Systemic imbalance
- Homeostatic regulation maintained primarily by CVS. Dependent on CO, uncompromised vascular system, sufficient blood vol, tissues that can extract O₂ through capillaries, adequate BP.

Stages of Shock:

1. Initial stage: Triggered by underlying cause/condition
2. Compensatory: Body activates neural/hormonal/biochemical mechanisms in an attempt to overcome the increasing demands of anaerobic metabolism and maintain homeostasis
3. Progressive: Begins when compensation fails
4. Irreversible: Decreased perfusion from peripheral vasoconstriction and decreased CO exacerbate anaerobic metabolism. Organs begin to fail and body overwhelmed.

Hypovolemic Shock:

- Clinical syndrome that results from decreased intravascular volume. Usually due to haemorrhage, fluid or electrolyte loss.
- This loss leads to an inadequate tissue perfusion that results in cellular dysfunction and cellular damage. Eg: haemorrhage from trauma, surgeries, excessive diuresis.
- Characterised by decreased CO (SV & HR), BP.
- Body retains sodium in an effort to increase ECF in intravascular space (RAAS).