

Approach to a case of Hypotension and Shock

Shock is an Emergency

**Assessment and resuscitation go hand in hand
because time is critical**

Remember

Hypotension is a late manifestation of shock

Definitions and Meanings

- **The Jugular Venous Pressure (JVP)**
- **The Central Venous Pressure (CVP)**

Definitions and Meanings

- **The Jugular Venous Pressure (JVP)** is an observed pressure over the jugular veins
- **The Central Venous Pressure (CVP)**

Definitions and Meanings

- **The Jugular Venous Pressure (JVP)** is an observed pressure over the jugular veins
- **The Central Venous Pressure (CVP)** is a measured pressure in the right atrium by means of a catheter attached to a manometer

Definitions and Meanings

Capillary Nail Refill Test

- Pressure is applied to the nail bed until it turns white (blanching). Then pressure is removed.
- Time taken for return of pink colour to the nail is considered (capillary refill).

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Capillary Nail Refill Test

- Pressure is applied to the nail bed until it turns white (blanching). Then pressure is removed.
- Time taken for return of pink colour to the nail is considered (capillary refill).
- **Blanch time > 2 seconds is a delayed response.**
 - Dehydration
 - Shock
 - Peripheral vascular disease (PVD)
 - Hypothermia

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It is defined by the presence of **multisystem, end organ hypo perfusion** causing **cellular injury**.

Cellular injury **further compromises perfusion** through functional and structural changes in the microvasculature **through mediators**

Thus, setting up a **vicious cycle**.

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- **Early Shock**
- **Late Shock**

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- **Early Shock**
 - No significant organ failure
- **Late Shock**
 - Multi-organ failure. > 80% mortality

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- **Pulmonary Vascular Resistance (PVR):**

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- **Pulmonary Vascular Resistance (PVR):** An index of arteriolar constriction in the pulmonary circulation

Pathogenesis of Shock

$$\text{MAP} = \text{CO} \times \text{SVR}$$

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or

$$\text{MAP} / \text{CO} = \text{SVR}$$

Pathogenesis of Shock

$$\mathbf{MAP = CO \times SVR}$$

MAP- Mean Arterial Pressure (Measurable: DBP +1/3 PP)

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CO- Cardiac Output -Inferable (Pulse Pressure =SBP- DBP)

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$$\text{MAP} = \text{CO} \times \text{SVR}$$

MAP- Mean Arterial Pressure (**Measurable**: SBP + DBP/ 2)

CO- Cardiac Output (**Inferable**; Pulse Pressure= SBP- DBP)

SVR-Systemic Vascular Resistance: (can be **calculated**)

Pathogenesis of Shock

- **Diminished Cardiac Output**

Is the Heart full or empty?



Pathogenesis of Shock

- **Diminished Cardiac Output**
 - Heart Full (Cardiogenic)
 - Heart Empty (Hypovolemic)

Pathogenesis of Shock

- **Diminished Cardiac Output**
 - Heart Full (Cardiogenic)
 - Heart Empty (Hypovolemic)
- **Increased Cardiac Output**

Pathogenesis of Shock

Diminished Cardiac Output

$$\text{MAP} / \downarrow \text{CO} = \uparrow \text{SVR}$$

- Narrow Pulse Pressure (PP correlates well with SV)
- Low volume pulse
- Cool extremities
- Delayed capillary refill

Pathogenesis of Shock

Increased Cardiac Output

$$\text{MAP}/\uparrow\text{CO} = \downarrow\text{SVR}$$

- Wide Pulse Pressure (esp. low DBP)
- Bounding pulse
- Warm extremities
- Rapid capillary refill

Pathogenesis of Shock (↑CO)

$$\text{MAP} = \text{CO} \times \text{SVR}$$

or

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- If a hypotensive patient has high CO, it can be inferred that **reduced BP is a result of decreased SVR**

Pathogenesis of Shock (↓CO)

- **Low** Intravascular and Cardiac Volume
- **Increased** Intravascular and Cardiac Volume

Is the Heart full or empty?



Pathogenesis of Shock (↓CO)

Low Intravascular and Cardiac Volume

- Hemorrhage
- Volume Losses (vomiting, diarrhea, Polyuria)

Pathogenesis of Shock

Low Intravascular and Cardiac Volume

- Hemorrhage
- Volume Losses (vomiting, diarrhea, Polyuria)
- JVP/ CVP is reduced
- What do you think the other findings will be?

Pathogenesis of Shock CO

Increased Intravascular and Cardiac Volume

- Increased JVP/ CVP
- Extremity edema
- S3/ S4 gallops
- Basal crepitations
- X Ray
 - Cardiomegaly
 - Widened vascular pedicles, Kerley B Lines
 - Pulmonary edema