Approach to Shock

Terminology/Basic Info:

- Shock = inadequate O2 delivery to tissue → poor perfusion → end organ dysfunction
  - Compensated = with normal BP
    - Important → shock ≠ ↓BP
  - Decompensated = with hypotension
- End organs affected:
  - HEART → arrhythmias, MI/ACS, hypotension
  - LUNGS → pulmonary edema, ARDS
  - CNS → ↓LOC, change in LOC (confusion, agitation), CVA
  - LIVER → ↑liver enzymes + LFTs (INR/PTT = coagulopathy)
  - KIDNEY → acute renal failure (ARF)
- **Shock Index** = HR/sBP
  - If value >1 → indicated HR > sBP = (sicker patient)
- Potential abnormalities in Shock:
  - **Labs**:
    - ↑WBC, ↑/↓platelets, ↑lytes if ARF (esp. ↑K+) with ↑Cr & BUN
    - ↑Liver enzymes, ↑INR/PTT
    - ↑Trop
  - **Diagnostic modalities:**
    - ECG → arrhythmias
    - CXR → ARDS, pulmonary edema
    - CT head → if stroke like symptoms with associated abnormalities
- **Types of shock:**
  - **S**eptic
  - **H**ypovolemic
  - **O**bstructive
  - **C**ardiogenic
  - Anaphylacti"**K**"
- **General Approach to Tx:**
  - ABCs:
    - Airway → ensure patent (intubate if not patent/↓LOC)
      - Note → drugs for induction of intubation can cause further ↓BP
    - Breathing → give 100% O2 +/- ventilator if mechanical ventilation required
    - Circulation → IV crystalloids (RL, NS) +/- vasopressors if indicated
  - Success of Shock Treatment:
    - Success = normal VS, no signs end organ dysfunction (↓lactate)

1. SEPTIC Shock:

- Cause = **Infection** leading to significant peripheral vasodilation → ↓SVR + ↓venous return → ↓intravascular volume → ↓CO
- Presentation:
  - Signs of INFECTION:
    - Fever
    - Look for focus → ears, throat, neck stiffness (meningitis), sputum production/cough, abdo pain, dysuria/LUTS, signs of cellulitis
  - Warm & flushed from vasodilation = **WARM SHOCK**
    - ↑HR, ↑pulse pressure
  - Signs of end organ dysfunction:
    - HEART → Changes in CO from ischemia, arrhythmias
    - CNS → confused, ↓LOC
    - LUNGS → ARDS, pulmonary edema
- Labs:
  - In addition to shock abnormalities listed above → values point to infection
    - ↑↑WBC, ↑Lactate
  - Look for source of infection:

        - Cultures (urine, blood), CXR (if susp pneumonia), LP (if susp meningitis, encephalitis)
- Dx = shock + infection
- Tx:
    - Main = **++IVF** & early broad spectrum **ANTIBIOTICS**
        - +/- blood transfusion
        - +/- vasopressor (dopamine, NE)
    - Foley catheter → monitor UO
    - +/- central venous line

2. HYPOVOLEMIC Shock

- Most common type of shock
- Cause = **Volume loss** → blood loss (trauma, GI bleed) or fluid loss (burn, vomiting/diarrhea)
- Presentation:
    - Will be peripherally "shut-down" with poor perfusion (↓cap refill, cool) = **COLD SHOCK**
        - ↑HR, ↓pulse pressure
    - Look for <u>focus</u> of blood/volume loss
        - Hx of bleed (GI, GU), vomiting/diarrhea, trauma
        - On Px → evident source of bleeding or volume loss
- Labs:
    - ↓Hg (if blood loss), ↑Hg (if fluid loss), ↑Cr
    - Beta-HCG for all women of child-bearing age to r/o ectopic rupture (++bleeding)
- Tx = ↑volume → fluid
    - **IVF** (NS, RL)
    - If bleeding:
        - 1 = transfuse
        - 2 = stop bleeding (endoscopy if GI, OR if trauma/ectopic pregnancy)

3. OBSTRUCTIVE Shock

- Cause = obstructed blood **flow** from heart
    - **Tension PTX** = mediastinal shift →↑pressure on heart → ↓CO
    - **Cardiac tamponade** = ↑fluid in pericardium → ↑pressure on heart → ↓CO
    - **PE** → obstruction of pulmonary blood flow → ↓LA return → ↓CO
- Presentation → think of causes
    - Tension PTX → SOB, ↓ipsilateral breath sounds, ↑JVP, contralateral tracheal deviation
    - Cardiac tamponade → ↓heart sounds, ↑JVP
    - PE → pleuritic CP, SOB, signs of DVT
- Dx:
    - Suspicion of tension PTX from presentation above = Dx (no imaging required prior to tx)
    - Suspicion of tamponade → bedside US (pericardial fluid), ECG (↓voltages)
    - Suspicion of PE → CT chest (if stable)
- Tx:
    - 1st = **IVF**
    - 2nd = specific depending on cause
        - Tension PTX → needle decompression + chest tube insertion
        - Cardiac tamponade → pericardiocentesis
        - PE → anticoagulation +/- thrombolysis

4. CARDIOGENIC Shock

- Cause = inadequate cardiac **contracting** (↓pumping)
    - ACS, valve dysfunction, arrhythmias
- Presentation:
    - Will be peripherally "shut-down" with poor perfusion (↓cap refill, cool) = **COLD SHOCK**
        - ↑HR, ↓pulse pressure
    - If from:
        - ACS/MI → CP
        - Arrhythmia → palpitations
        - Valve dysfunction → SOB

    - All can result in ↑JVP from poor filling
- Dx:
    - Suspicion of ACS → serial ECG + cardiac enzymes
    - Suspicion of valve dysfunction → bedside US
    - Suspicion of arrhythmia → ECG + cardiac monitoring
- Tx → depends on above etiology
    - Need to be very **cautious** with delivery of fluids → may enter <u>pulmonary edema</u> from ↓CO
        - Give SMALL boluses (250-500cc) if required → watch resp status if giving fluids
    - +/- Vasopressor (dobutamine) if indicated
    - Specific:
        - ACS → reperfusion (stent vs thrombolysis)
        - Valve → surgery
        - Arrhythmia → anti-arrhythmic vs defibrillation

5. ANAPHYLACTIC Shock

- Cause = **allergen** (that patient previously sensitized to) → anaphylactic reaction = significant peripheral vasodilation → ↓intravascular volume
- Presentation:
    - Hx of allergen exposure with **rapid onset** of symptoms post exposure
    - Warm & flushed from vasodilation = **WARM SHOCK**
        - ↑HR, ↑pulse pressure
    - Urticaria, angioedema
- Tx = AIRWAY protection
    - 1st = **Epinephrine** IM/SC 1:1000 → repeat if necessary
    - If remains in shock post epi:
        - IVF
        - +/- IV epinephrine infusion (1:10000)
    - Antihistamines
    - Steroids

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