

SHOCK / HYPOTENSION

(Last updated 08/12/2019; Reviewed by: Ognjen Gajic MD; S Chandralekha Kruthiventi MD)

PRESENTING COMPLAINT: Hypotension, tachycardia, dizziness

FINDINGS

- **A** Check airway
- **B** ↑ RR, increased work of breathing
- **C** ↓ BP, ↑ HR, rapid and thready pulse, mottling
- **D** Variable altered (V,P,U,D)*
- **E** Cold, pale or cyanotic, clammy and mottled extremities (cutis marmorata), warm extremities (septic shock); bleeding, acute abdomen
- **L_{PC}** ↓ Hb (trauma), ↑ WCC (septic shock), ↓ platelets, ABG- ↓ pH metabolic acidosis, ↑ lactate, serum electrolytes, urea and creatinine, PT/APTT, blood cultures, blood type and crossmatch, urine analysis
- **U_{PC}** Lungs: exclude B lines (risk of fluid bolus, pneumonia, edema, ARDS) & effusions, Heart (effusion, RV/LV function, IVC size & collapsibility); Abdomen: (fluid, source of infection, urine in the bladder; Focused assessment with sonography for trauma (FAST)

***V** (verbal), **P** (pain), **U** (unconsciousness), **D** (delirious)

U_{PC} (point of care ultrasound) **L_{PC}** (point of care labs)

OTHER HISTORY

- **Predisposing factors:** Trauma, bleeding, recent infection, immunosuppression
- **Signs & Symptoms:** Low blood pressure, altered mental status, decreased urinary output, +/- cold extremities, tachycardia

DIFFERENTIAL DIAGNOSIS

- Differentiate cardiogenic shock, hypovolemic shock, distributive shock (septic)

OTHER INVESTIGATIONS

- **Labs:** CBC, lactate, electrolyte panel, pan-cultures, blood type and screen, urine drug screen, urine pregnancy test, troponin
- **Monitoring:** Vital signs, urine output, mental status, lactate
 - Consider: arterial line, central venous pressure, ScVO₂
- **Imaging:** CXR, US/Echo, CT scan

THERAPEUTIC INTERVENTIONS

- **General**
 - Large bore venous access for fluid resuscitation; consider intraosseous access
 - Central line should be placed for vasopressors
- **Optimize O₂ supply**
 - Oxygen: goal O₂sat ≥ 90-95%
 - Consider RBC transfusion: goal Hb > 7-9 mg/dL if ScVO₂ < 70%
- **Cardiac output**
 - Preload fluid bolus 30 mL/kg
 - Contractility: inotrope, mechanical devices
 - Heart rate: pacemaker, cardioversion, antiarrhythmic
 - Perfusion pressure, particularly coronary (vasopressor)
- **Limit O₂ consumption:** Consider intubation, analgesia-sedation, NMB, correction of hyperthermia
- **Specific to underlying etiology**
 - **Cardiogenic/obstructive:** High venous pressures, US evidence of impaired LV/RV function or severe tachy/brady-arrhythmia, cold extremities, narrow pulse pressure
 - **Arrhythmia:** Cardioversion, external pacemaker, inotrope +/-, anticoagulation
 - **ACS/PE/tamponade/aortic, dissection/septum, or valve chordal rupture:** PCI, thrombolysis, pericardial tap, surgery
 - Inotrope (dobutamine/milrinone) +/- vasopressor (nor/epinephrine/dopamine)
 - **Norepinephrine is initial choice** in hypotension unless bradycardia
 - Consider mechanical circulatory support (IABP, ECMO)
 - As-needed pacemaker
- **Hypovolemia: low venous pressures, normal LV/RV function**
 - Fluid resuscitation: early and rapid volume repletion
 - **Crystalloids only;** albumin may be considered, but not as a first choice
 - Caution in bleeding until hemostasis
 - If bleeding, control source: surgery, endoscopy, angioembolization
 - Serial Hb, correct hemostasis (coagulation, thrombocytopenia), early use of warmed RBC, FFP, and platelets; correct metabolic acidosis; hypothermia; hypocalcemia; hyperkalemia
- **Distributive:** Variable venous pressures, hyperdynamic myocardium, low diastolic BP, persistent hypotension after fluid bolus, warm extremities
- **Sepsis:** Cultures, antibiotics, fluids +/- vasopressors (for details, see sepsis card)

- **Adrenal insufficiency:** Steroids
- **Anaphylaxis:** Stop allergen exposure, fluid resuscitation, epinephrine (bolus followed by infusion, if needed), corticosteroids, antihistamines (H1 and H2 blockers), consider airway edema and bronchospasm

ONGOING TREATMENT

- **Further Treatment**
 - Antimicrobial therapy, if administered empirically: deescalate according to culture results
 - Glucose control: keep blood glucose level < 180mg/dl
- **Prophylaxis:** VAP bundle, if intubated; HOB elevation; DVT prophylaxis; ulcer prophylaxis; daily sedation break and assessment of extubation; daily oral care with chlorhexidine
- **Goals of care:** Discuss with the patient/family

REFERENCES & ACKNOWLEDGMENTS

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