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UNDIFFERENTIATED SHOCK

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CASE 1

26 year old female found unconscious at a friend’s house and brought to the ER. Has an unremarkable past medical history. We can not obtain a history from the patient.

PE: BP 70/40, P 138, RR 38, temp 99.2, O2 sats won’t read
Moaning occasionally, cool extremities, moves all extremities, does not follow commands, has dried vomitus on her shirt, no evidence of trauma, lungs are clear, abd soft
QUESTIONS

1. What would you do first with this woman?
2. What is the differential diagnoses for this woman?
3. What would you order?
CASE 1

Was put on a cardiac monitor and O2 mask. Had two 14 gauge IVs placed and given 2 liters of NS. BP improved to 90/50, pulse 128

RBS: High
BS on lab: 1240
ABG: pH 6.76, PCO2 9, PO2 206
Serum ketones: high

Diagnoses:
1) Hypovolemic shock
2) Diabetic ketoacidosis
Shock occurs when the circulatory system is unable to deliver adequate blood flow, depriving the vital organs of oxygen and nutrients. (Vital organs being brain, heart, lungs, liver, kidneys)
Reduced systemic tissue perfusion
Decreased oxygen delivery to the tissues
Increased oxygen consumption, which is greater than the oxygen delivery
Physiology of Shock

Cellular Dysfunction:
- Intracellular edema
- Malfunctioning membrane pumps
- Leakage of intracellular contents

Systemic Dysfunction:
- Stimulation of the inflammatory cascade
- Lactic acidosis
Compensated Shock
- Tachycardia, but fairly normal BP
- Cool cyanotic extremities
- Tachypnea
- Common in children and young, healthy adults

Uncompensated Shock
- Tachycardia
- Hypotension
- Tachypnea
- Cool cyanotic extremities
- Altered mental status (not perfusing their brain)
FOUR CATEGORIES OF SHOCK

1. HYPOVOLEMIC
2. CARDIOGENIC
3. DISTRIBUTIVE
4. OBSTRUCTIVE
HYPOVOLEMIC SHOCK

1. **Losing Fluid**
   - Vomiting/ Diarrhea
   - Urine loss (DKA, hypercalcemia)

2. **Losing Blood** (hemorrhagic shock)
   - Trauma
   - GI bleeding
   - Ectopic pregnancy
   - Post-partum hemorrhage
Five places you will bleed to death with trauma:

1. On the floor
2. Into the chest
3. Into the abdomen
4. Into the retroperitoneum
5. Into the thighs (bilateral femur fractures)
CARDIOGENIC SHOCK

Rhythm problem
- VT, SVT, A-fib with RVR, bradycardia

Valve problem
- severe valvular stenosis or regurgitation

Pump problem
- severe heart failure, acute MI
DISTRIBUTIVE SHOCK

There is a normal intravascular volume and the pump is working normally. However, there is either extensive leaking of fluid through the capillaries or there is diffuse vasodilation.

Capillary leak
- Sepsis (septic shock)
- Extensive burns
- Severe pancreatitis
- Toxic Shock Syndrome

Vasodilation
- Sepsis
- Toxic Shock Syndrome
- Anaphylaxis
- Overdoses with antihypertensive or cardiovascular medications
- Neurogenic shock (lose sympathetic tone)
OBSTRUCTIVE SHOCK

Something is blocking the forward movement of blood.

- Tension pneumothorax
- Pericardial tamponade
- Pulmonary embolus (large)
WORK UP

Immediately get:
- Finger stick Blood Sugar
- ECG
- 2 large bore IVs

Also order:
- CBC
- Renal Function
- Liver Function
- Lactate level
- ABG
- Cardiac enzymes
- Urinalysis
- CXR
- Consider blood cultures
LACTATE IN SHOCK

- **Lactate Levels** have been shown to positively correlate with morbidity and mortality (the higher the initial lactate, the higher the morbidity and mortality)

- **Lactate Clearance** has been shown to negatively correlate with morbidity and mortality (the greater the clearance, the lower the morbidity and mortality)
FOCUSED EXAMINATION WITH SHOCK

- Look for evidence of vomiting/diarrhea
- Look for evidence of trauma or bleeding
- Abdominal exam looking for tenderness or distention
- Rectal exam for blood
- Cardiac exam for murmur
- Cardiac monitor and ECG early looking for rhythm and evidence of ischemia
- Blood glucose early
- Look for evidence of infection
- Consider anaphylaxis or overdose
ULTRASOUND EXAM FOR SHOCK

RUSH – Rapid Ultrasound in Shock and Hypotension

- First published in 2009
- Reviewed in Critical Care Research and Practice 2012
RUSH Examination

Involves six main components:

1. **Heart** (pericardial effusion, dilated RV, contractility of LV)
2. **Inferior Vena Cava** (collapsibility during inspiration)
3. **FAST exam** (free fluid)
4. **Aorta** (aneurysm >5 cm)
5. **Pneumothorax** assessment
6. **DVT** assessment

http://emcrit.org/rush-exam/original-rush-article/
TO MAKE IT SIMPLE: RUSH

1. Inferior Vena Cava – It tells you what to do with fluids. If the IVC collapses more than 50% during inspiration, give fluids rapidly. Repeat IVC exam after fluids are given.
2. E–FAST exam
3. Aorta exam
4. DVT exam if concerned about large PE
TREATMENT HYPOVOLEMIC SHOCK

- Place at least two large bore IVs (18, 16, or 14 gauge)
- Give 2 liters of NS or RL rapidly under pressure
- Type and cross if bleeding
- Get emergency blood from the blood bank if needed. O neg blood can be given to everyone. Can also use type specific blood.
- Follow IVC by U/S – continue aggressive fluid resuscitation until IVC collapses <50% on inspiration
TREATMENT CARDIOGENIC SHOCK

- Cardiovert arrhythmias if in shock
- Can give Atropine and externally pace if bradycardic and in shock
- Give 500 ml of NS if needed
- Consider vasopressors (Norepinephrine)
- Consider dobutamine
- Consider hyperkalemia as the cause of cardiogenic shock if widened QRS, bradycardic, and renal failure
TREATMENT
DISTRIBUTIVE SHOCK

- Place 2 large bore IVs
- Give 2 liters of NS or RL under pressure
- Strongly consider vasopressors (Norepinephrine) after IVC collapses less than 50% with inspiration and still hypotensive
- Consider antibiotics early if concerned about sepsis
TREATMENT
OBSTRUCTIVE SHOCK

- Identify and treat the underlying cause
- Bolus with fluid to maximize the intravascular volume

- Needle decompression and chest tube for tension pneumothorax
- Pericardiocentesis for pericardial tamponade
- Consider giving TPA for massive pulmonary embolus
KEY POINTS

- Do not miss patients in compensated shock
- Quickly identify patients in shock and treat aggressively
- Children in shock will maintain a BP until they crash and code
- Consider anaphylaxis or overdose if the cause is unclear
- IV fluid boluses can be given for all causes of shock to maximize the intravascular volume
- Vasopressors do not help in hypovolemic shock. These patients are already vasoconstricted.