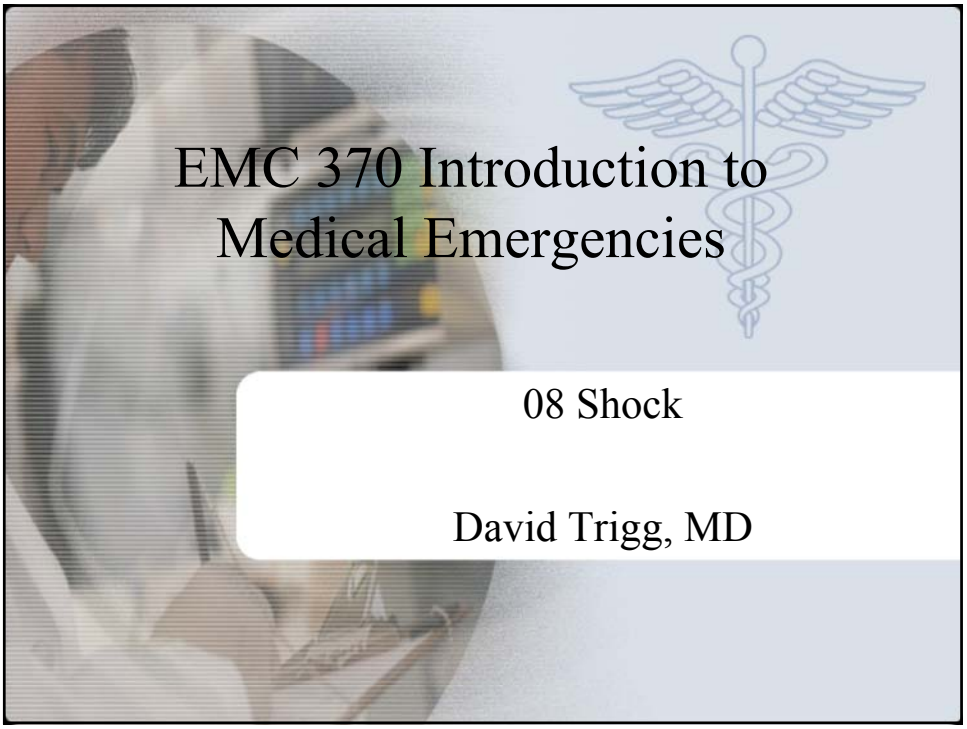
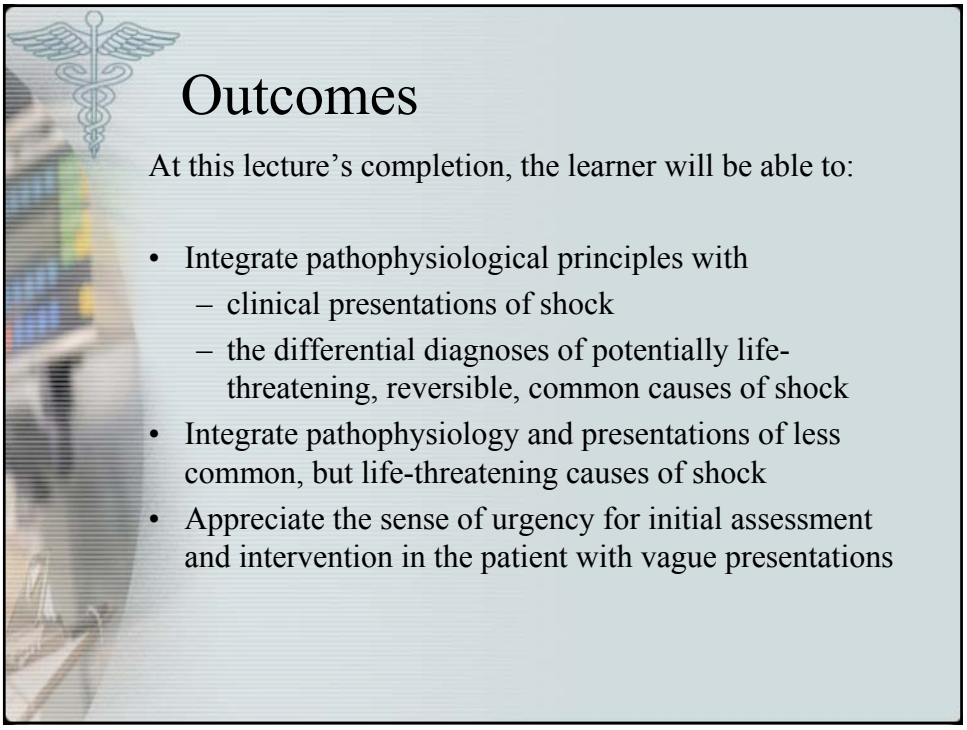


EMC 370 Introduction to Medical Emergencies

08 Shock

David Trigg, MD



Outcomes

At this lecture's completion, the learner will be able to:

- Integrate pathophysiological principles with
  - clinical presentations of shock
  - the differential diagnoses of potentially life-threatening, reversible, common causes of shock
- Integrate pathophysiology and presentations of less common, but life-threatening causes of shock
- Appreciate the sense of urgency for initial assessment and intervention in the patient with vague presentations

Outcomes, continued

- Recognize the settings or risks for shock in emergency medicine
- Organize the initial stabilization of shock
- Recognize early signs and symptoms of shock
- Discuss drugs that may be used to treat shock
- Discuss the body's physiologic response to changes in perfusion (4-2.17)
- Describe the effects of decrease perfusion, cellular ischemia, capillary stagnation (4-2.17-2.2 0)

Outcomes, continued

- Describe the pathophysiology, clinical features, and it treatment of cardiogenic shock (5-2.112-118)
- Describe the pathophysiology of spinal shock (4-6.13)
- Integrate History, assessment findings, pathophysiological principles with a treatment plan for various forms of shock (4-2.42-2.44)
- Describe some of the epidemiologic considerations for shock, in particular, cardiogenic shock , septic shock, neurogenic shock

Management

- Initial approach is the same as for coma
- Patient recognized as ALS, as potentially unstable, and not mistaken for stable
  - C A B C D E / C O_2 M_3 E B I G

Definition

Shock: inadequate tissue perfusion

Normal Perfusion

- adequate pump
- adequate volume
- adequate pipes (vasculature)

Inadequate Perfusion

Inadequate perfusion is a result of:

- Inadequate pump
  - Poor squeeze (muscle failure)
  - No entry (obstructed)
- Inadequate volume
  - Not enough water in the pipes
- Inadequate pipes
  - “leaky”, “paralyzed”, or flaccid pipes

Consequences

- cells are deprived of O_2
- cells accumulate CO_2 and H^+ (lactic acidosis)
- leading cellular dysfunction + death
- then tissue destruction + malfunction
- finally death of the patient

Dispatch does not Report "Shock"

- Before the usual discussion of:
  - types of shock
  - disease states and how their pathophysiologies cause shock
  - treatments of each of these
- First, consider the prehospital clinical picture.
  - How do shock patients present to the paramedic?
  - What are their symptoms and signs?

Pathophysiology of S/S

The body's circulatory coping mechanism is designed to try to:

- maintain perfusion
  - preferentially to vital organs
    - heart
    - brain
- reduce perfusion (if necessary) to:
  - non-vital organs
    - skin
    - extremities

Recognizing Shock

- Importance of early recognition
  - the ideal time for intervention
    - avoid rapid deterioration
    - increase likelihood of successful interventions
- Method
  - recognizing clinical settings or risks
  - recognizing early signs and symptoms

Signs and Symptoms of Shock

1. Restlessness, agitation, anxiety
2. Skin: Cold, clammy, pale
3. Pulse: Rapid, thready
4. Respiration: Rapid, shallow
5. Thirst
6. Orthostatic BP +/or HR changes / Pulse Pressure Δ
7. Confusion
8. Decreased urine output
9. SBP < 90 mmHg

Clinical Features

Not uncommon to have patient present with nonspecific symptoms

- Confusion
- Listlessness, lethargy
- Weak and dizzy

Vital Signs

- No single vital sign or value is diagnostic of shock
- VS are neither sensitive, nor specific

Vital Signs

- VS are neither
  - sensitive
  - specific
  - consistent
- Bradycardia
  - may be present in intra abdominal hemorrhage
  - secondary to vagal stimulation
  - may be present in patients taking beta blockers
- BP
  - may initially be slightly elevated in shock
    - secondary to:
      - vasoconstriction
      - tachycardia

No Improvement

- No clinical improvement
- Failure to respond to basic shock treatment
- Rule out occult causes:
  - Allergic reactions
  - Occult bleeding
  - Tension pneumothorax
  - Metabolic shock

Shock Treatment

Standard fluid resuscitation

- 20 ml / kg IV over 10 min.
- "Under resuscitation "
  - Volume necessary to main SBP of 70 mmHg
- Ideal resuscitative fluid
  - Blood (type O)

Vasopressors

- Only after volume resuscitation
- Dopamine 10 mcg / kg / min IV drip
- Norepinephrine 10 mcg / min IV bolus;
  then, 1 mcg / min IV drip

Septic Shock

- Incidence is rising
- Mortality 20-80%
- Immunocompromised patients
  - DM
  - Chemotherapy
  - Indwelling catheters
- Clinical features
  - ALOC
  - $T^0 > 38^0$ or $< 36^0$
  - Wide pulse pressure (unlike most other forms of shock)
  - Warm extremities
  - Hyperglycemia
  - Minimal response to fluid challenge

Treatment

Septic Shock Treatment

- ABC's
- IV NS WO (4-6 L)
- Dopamine 10 mcg / kg / min IV drip
- Norepinephrine 10 mcg / min IV bolus; then, 2 mcg / min IV drip
- Ceftriaxone 1 gram IV

Cardiogenic Shock

- Etiology
  - PE
  - tamponade
  - MI
    - most common
    - onset: 7 hours from onset of symptoms (median)
- Risk factors
  - Female
  - Advanced age
  - Large, anterior MI
  - Hx of CHF
  - DM
- Mortality 80%

Clinical Features

- Narrow pulse pressure
- ALOC
- LCHF and RCHF
- Abnormal 12 lead

Treatment

- Check DNR status (80% mortality)
- ASA 160 mg chew, if not allergic
- Mild-moderate
  - Dobutamine 10 mcg / kg / min
- Severe
  - Dopamine 10 mcg / kg / min IV drip
  - NTG 10 mcg / min IV drip

Neurogenic Shock

Spinal cord injury
- The higher the level of injury, the worse the shock
- Disruption of the sympathetic constriction
- Unopposed vagal activity
  - Bradycardia
  - Hypotension

Neurogenic shock
- Diagnosis: one of Exclusion
- R/O septic shock
- Tx: high dose methylprednisolone - controversial

Obvious Shock Risks

- Pain
- Bleeding
- Trauma
- Pregnancy
- Elderly / infant
- Sepsis - prone
- Bee sting
- ALOC

Initial treatment

for all types of Shock

1. Position pt
2. Airway
3. Oxygen via NRB
4. Control external bleeding
5. VS
6. Cardiac monitoring
7. IV (#16 gauge, Draw blood)
8. Consider Fluid Challenge
9. Consider PASG
10. Recheck VS (neuro)

Clinical Settings

- Pain
  - Chest pain
  - Abdominal pain
  - Pelvic pain
- Pregnancy
  - “Any female 12 - 50 y/o who calls 911”
- Vague
  - Elderly / infant
  - Sepsis-prone / immunocompromised
  - No obvious allergen / exposure (Bee - sting,…)
  - ALOC

Shock Clinical Settings

- Pain
  - Chest pain
    - MI
    - Pulmonary Embolism
    - Tension Pneumothorax
    - Thoracic Aneurysm
  - Abdominal pain
    - Abdominal Aortic Aneurysm
    - Ectopic (tubal) [ruptured] pregnancy
  - Pelvic pain
    - Abdominal Aortic Aneurysm
    - Ectopic [ruptured] pregnancy
- “Any female < 80 y/o”
    - Ectopic pregnancy

Vague Presentation

Immunocompromised

- Extremes of age
- Diabetes
- Post operative
- Burns
- Indwelling catheters
- Cancer / chemotherapy patients
- HIV
- IV drug abuse

Summary

We have discussed:

- Recognizing the clinical settings and risks for shock in emergency medicine
- Prompt recognition of early warning signs and symptoms of shock
- Organization of initial stabilization of shock
- Drugs used to treat the various forms of shock