EMC 370 Introduction to Medical Emergencies

09 Anaphylaxis

David Trigg, MD

Outcomes

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

- Integrate pathophysiological principles with clinical presentations, common causes, and treatment of anaphylactic shock. (5-5.8-5.16)
- Describe epidemiology and risks of anaphylaxis. (5-5.3,4; 5-5.1)

Outcomes, continued

- Appreciate the sense of urgency for initial assessment and intervention in the patient with presentations life-threatening, reversible anaphylactic shock.
- Recognize signs and symptoms of anaphylactic shock.
- Discuss drugs that may be used to treat anaphylactic shock.

Management

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

No Clinical Improvement

Failure to respond to basic shock treatment

- Standard fluid resuscitation
  - 20 ml / kg IV over 10 min
- Rule out occult causes
  - Allergic reactions

Definition

Anaphylactic Shock

- sudden, catastrophic
- frequently fatal
- type of massive allergic reaction
- resulting in “hot” shock
- upper + / or lower airway obstruction

Anaphylaxis

Onset

- occurs within minutes after
  - Injection
  - Sting
  - Ingestion
  - Inhalation , rarely

Incidence

- two most common causes
  - true penicillin allergy
  - stings

Normal Perfusion

- adequate pump
- adequate volume
- adequate pipes (vasculature)
  - If inadequate pipes → shock
    - "leaky", "paralyzed" or flaccid pipes

Anaphylaxis Pathophysiology

(1) Loss of PVR

- loss of vasc. permeability
- $\rightarrow \downarrow$ venous return $\rightarrow \downarrow$ C.O.

("distributive" type shock)

(2) Airway edema

- face and
- large airway swelling
- small airway / bronchospasm

Anaphylaxis S/S

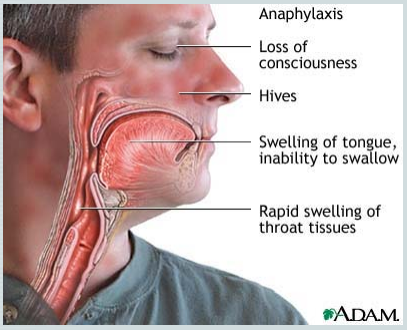
- Restlessness, agitation, anxiety
- Skin: **NOT** cold, clammy, pale skin
- Pulse: Rapid, **NON** - thready pulse
- Respiration: Rapid, shallow breathing
  Perhaps with wheezing
- Thirst
- Confusion
- SBP < 90 mmHg
- Failure to respond to basic shock treatment

S/S of Anaphylaxis

1. apprehension
2. itching
3. facial swelling (lips, eyes, tongue)
4. coughing, wheezing, dyspnea
5. abdominal pain, back pain
6. hypotension, syncope, arrest may occur before any or most of the other signs of shock

When to Treat?

- As soon as anaphylaxis is suspected, begin treatment.
- Do not wait until anaphylaxis has fully developed.



A Patient With No Clinical Improvement

- Rule out occult anaphylactic shock
- If Failure to respond to basic shock treatment
  - Standard fluid resuscitation
    - 20 ml / kg IV over 10 min

Then if needed,

- Vasopressors
  - ***During*** volume resuscitation
  - Epinephrine
    - ***NOT*** Dopamine
    - ***NOT*** Norepinephrine

Anaphylaxis Treatment

1. Airway
2. Oxygen
3. Tourniquet → constricting band
4. IV
5. Drugs

Drug Treatment

First line
- Epinephrine
- O_2
- IV NS

Second line
- Diphenhydramine (H_1 blocker)*
- Ranitidine (H_2 blocker) (Zantac®)*
- Methylprednisolone / Dexamethasone*
- Glucagon
- Albuterol
- Aminophylline

* **ALL** patients with anaphylaxis should receive H_1, H_2, + steroids

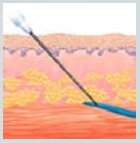
Drug Treatment

Epinephrine

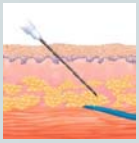
- The cornerstone of treatment for anaphylactic reactions
- α: ↑ PVR → ↑ BP
- β_1: ↑ HR
- β_2: ↑ bronchodilation / ↓ wheezing
  - The beneficial β effects can be blocked if the patient is taking a Beta-blocker drug (LoPressor®)

Drug Treatment

Epinephrine dose depends upon
- severity of signs + symptoms
- +/- IV access



Moderate – severe
- give IV Epi
- respiratory failure
  - AO / edema, severe bronchospasm
- shock



Mild
- give SC Epi
- no respiratory failure
  - no airway edema or severe bronchospasm
- no shock

Drug Treatment

Epinephrine
- Moderate - severe – give IV Epi
  - 100 mcg IV over 5 min
  - 100 mcg = 0.1mL of 1:1000 mixed with 10 mL NS (this is a 1:100,000 dilution)
  - then 1 mcg / min drip (1/2 mL / min or 30 mL / hr of standard* mix)

* standard mix: 1 mg Epi / 500mL NS

- Mild – give SC Epi
  - 0.3- 0.5 mL of 1:1000 SC

Drug Treatment

Epinephrine

- if IV can't be started and patient seems to be worsening
  - 0.5-1.0cc 1:1000 IM can be given
  - 0.5cc 1:1000 injected sublingually (profound shock)

Second Line Drugs

- Diphenhydramine (Benadryl) 25-50mg IM or IV
- Zantac 300 mg PO, or 50mg IV
- Methylprednisolone (Solumedrol) 125 mg IV or Dexamethasone 4-10 mg IV
- Albuterol 0.5cc (2.5mg) (1 amp/NS) HHN
- Glucagon 1mg IM
  - for a patient on a β -blocker and failing to respond to Tx

Second Line, continued

- Historically: Aminophylline for bronchospasm
  - 250 mg in 250cc IV, over 30min
  - pediatric 6mg/kg
- Aminophylline now out of favor
  - Very narrow therapeutic index
  - Inferior to Albuterol

Summary

We have discussed:

- Recognition of the clinical settings and risks for anaphylactic shock.
- Prompt recognition of early warning signs and symptoms of anaphylaxis.
- Drugs used to treat anaphylaxis.