Tetanus

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Epidemiology

- ~ 1 million cases per year worldwide
- 200,000 to 300,000 deaths annually
- Neonatal tetanus was targeted for elimination by the WHO in ‘95
- Neonatal tetanus still causes 5-7% of neonatal deaths
Pathology

- Spores of Clostridium tetani are found widely in soil
- Innoculated into wounds
- Transforms into active bacterium, produces tetanus toxin
- Toxin binds to neuroreceptors
- Disinhibits excitatory impulses
- Causes increased muscle tone, painful spasms and autonomic instability
Clinical scenario

- Generalized tetanus
- Local tetanus
- Cephalic tetanus
- Neonatal tetanus
Generalized tetanus

- Autonomic overactivity:
  - irritability
  - diaphoresis
  - tachycardia
  - labile BP
  - fever
Generalized tetanus

- Tonic contraction of skeletal muscles
- Intermittent, painful muscle spasms
- These cause classic signs/symptoms:
  - trismus
  - apnea
  - risus sardonicus
  - abdominal rigidity
  - opisthotonus
Localized tetanus

- Rare
- Tonic and spastic muscle contractions in one extremity or body region
- Usually evolves into generalized tetanus
Cephalic tetanus

- Due to injuries of head, neck
- Involves only cranial nerves
- Usually evolves into generalized tetanus
Neonatal tetanus

- Due to umbilical stump infection (eg application of cow dung to stump) versus non-sterile delivery
- Manifests as:
  - inability to suck
  - seizures
  - rigidity
  - spasms
Diagnosis

- Clinical:
  - tetanus prone wound
  - inadequate vaccination
  - consistent signs/symptoms
Management

- Wound care
- Antibiotics
- Neutralize toxin
- Control spasms
- Immunize
Wound care

- Aggressive wound debridement to:
  - remove spores
  - remove necrotic tissue necessary for spore germination
Antibiotics

- Play minor role
- Penicillin traditional drug of choice
- Metronidazole now preferred

Given likelihood of mixed infection:
- ceftriaxone for 5-7 days
Toxin neutralization

- Symptom causing tetanus toxin is irreversibly bound
- Can only neutralize unbound toxin
- HTIG 3000 to 6000 units IM
- ETIG 1500 to 3000 units IM
Symptom control

- Spasms are life threatening
- Put pt in a quiet room
- Drugs:
  - Benzodiazepines
  - Vecuronium
  - Propofol
  - Baclofen
Symptom control

- Autonomic dysfunction:
  - magnesium
  - labetolol
  - morphine
Immunization

- Disease does NOT confer immunity
- If primary immunization series in doubt:
  - 3 doses of tetanus toxoid
  - Booster every 10 years
Other care

- Bound tetanus toxin cannot be displaced
- Recovery requires re-growth of nerve terminals (4-6 weeks)
- Severe tetanus means a prolonged hospital course
- Consider:
  - nutritional support
  - ventilatory support
  - early PT
Prognosis

- **Neonatal:**
  - 10-60% fatality
  - may have long term neurologic deficits

- **Non-neonatal:**
  - 8-50% fatality
Tetanus in Haiti

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Tetanus in Haiti

- 4 yr old female brought to triage area 1-17-10
- Found under ruble in Port au Prince
- Presenting for evaluation of L LE injury
Tetanus in Haiti

- AF 90 BP unavailable
- General: Crying
- Heart: RRR
- Lungs: CTA
- Abd: NT, ND
- Extrems: large lacerations deep to muscle involving the R lateral calf and L shin
Tetanus in Haiti

- Wounds cleaned and bandaged
- Tetanus prophylaxis given
- Empiric abx (IM ceftriaxone)
- Plans for further debridement in OR
Tetanus in Haiti

- Following day,
- Febrile to 39.1, nuchal rigidity and intermittent arching of the back
- Consult re ? meningitis
Tetanus in Haiti

- General: Awake, alert, crying
- HEENT: Teeth clenched, neck stiff
- Heart: RRR
- Lungs: CTA
- Abd: NT, ND
- Wound: unchanged
- Neuro: Globally increased muscle tone
Tetanus in Haiti

- Clinical tetanus diagnosed
- Management:
  - High dose tetanus IgG
  - Continue Ceftriaxone
  - To OR for wound debridement
  - Diazepam prn
Tetanus in Haiti

- Following day:
  - Decreased muscle rigidity
  - Decreased spasms
  - Increased BP lability
  - Mg ggt added
Tetanus in Haiti

- That night:
  - IV loss
  - Benzos not given
  - Mg ggt not given
  - Intractable spasms, trismus
  - Vecuronium given, ventilation support started
Tetanus in Haiti

- Next AM:
  - Navy helicopter transfer to USS Comfort
  - Informed child coded and died shortly after arrival