Tetanus: A Reason to Vaccinate

Catie Chatowsky, PharmD
PGY1 Pharmacy Resident

I have nothing to disclose

Objectives:
- Identify the signs and symptoms of tetanus.
- Describe common treatments for tetanus.
- Recall the catch-up immunization schedule for tetanus coverage.

Vitals:
- Temp: 101.9 °F
- BP: 110/69 mmHg
- HR: 88 bpm
- RR: 22 bpm

Physical Exam:
- Eye: PERRLA
- Ears, nose, mouth and throat: Dry oral mucosa.
- Cardiovascular: RRR, No murmur.
- Respiratory: CTAB

Background: Tetanus

Background: Tetanus

Clostridium tetani:  
- Anaerobic gram-positive bacillus
  - Two toxins = tetanospasmin and tetanolysin
- Bacteria in same genus: Clostridium difficile, C. perfringens, C. botulinum

At the site of inoculation:
- tetanus spores enter the body and germinate
- release tetanospasmin into the bloodstream
  - Via retrograde axonal transport: toxin travels to neurons

Clinical Symptoms Continued

Autonomic dysfunction:
- Tachycardia, hypertension, and sweating
  - Episodes of rapidly alternating with bradycardia and hypotension are common

Tetanus Classification

4 types:
1. Generalized
   a. Muscles of the entire body
   b. Leads to opistotonus
2. Neonatal
   a. Generalized form (< 1 month of age)
3. Local
   a. Regional muscle spasm
4. Cephalic
   a. Localized tetanus within the head region

Acute Therapy:

Tetanus Immunoglobulin (TIg):
- Treatment or prophylaxis
  - After traumatic wound: non-immunized or suboptimally immunized persons

Intrathecal Administration

Acute Therapy:

Metronidazole (IV):
- 30-50 mg/kg/day in 3 divided doses for 7-10 days

Benzodiazepines - augment the effect of GABA on the GABA-A receptors of lower motor neurons

Diazepam - resource limited settings, survival benefit in children
  - compared to barbiturates and chlorpromazine

Midzolam - short-acting, limited evidence of use

Lorazepam - Binds to GABA receptor, improves GABA binding
  - No head-to-head trials
  - Non-specific dosing to response

Baclofen - GABA agonist

Magnesium Sulfate To Treat Spasm

Case Report: 6 Patients Treated

Botulism Toxin To Treat Spasm

Case Report: 6 Patients Treated

The Vaccine Discussion

Aluminum
Typically, adults ingest 7 to 9 milligrams of aluminum per day.

Do We Still Need to Vaccinate After a Patient has acquired Tetanus?
- Poorly Immunologic
  - Inadequate immune response after natural infection
  - Important to get full primary course of immunization

For an unvaccinated patient, 7 years of age or older, how do you complete a full primary course of immunizations to cover tetanus?

A. One TDaP, until Td Booster in 10 yrs
B. Two TDaPs, until Td Booster in 10 yrs
C. One DTaP, two TDaPs, until Td Booster in 10 yrs
D. Three TDaPs, until Td Booster in 10 yrs

Vaccination Timeline

Why Must All Individuals Be Vaccinated:
- Life-saving
- No herd immunity effect

Return to Patient Case

Blood Cultures:  
- No Growth (Final)

Chest Radiograph:  
- Impression:
  - Features of viral lower respiratory tract infection
  - No acute consolidative pneumonia

8 y.o., 26.9 kg

Attendance Code:
Text attendance code to 413-2002444  
Code: JASDEK


*Clostridium tetani:*

- Anaerobic gram-positive bacillus
  - Two toxins = tetanospasmin and tetanolysin
    - Bacteria in same genus: *Clostridium difficile, C. perfringens, C. botulinum*

- At the site of inoculation,
  - tetanus spores enter the body and germinate
  - release tetanospasmin into the bloodstream

- Via retrograde axonal transport: toxin travels to neurons

- Lockjaw (trismus)

- Grimace facial expression

- Generalized muscle spasms: severe pain
  - Respiratory spasms: respiratory failure
  - Back arching spasm (opisthotonus)

**Clinical Symptoms Continued**

Autonomic dysfunction:

- Tachycardia, hypertension, and sweating
  - Episodes of rapidly alternating with bradycardia and hypotension are common

- Associated with generalized tetanus
  - Sx occur when brainstem is affected by toxin
Tetanus Classification

4 types:
1. Generalized
   a. Muscles of the entire body
   b. Leads to opistotonus
2. Neonatal
   a. Generalized form (< 1 month of age)
3. Local
   a. Regional muscle spasm
4. Cephalic
   a. Localized tetanus within the head region

Acute Therapy:

Tetanus Immunoglobulin (TIg):
- Treatment or prophylaxis
  - After traumatic wound: non-immunized or suboptimally immunized persons

Intrathecal Administration
Acute Therapy:

Metronidazole (IV):
• 30-50 mg/kg/day in 3 divided doses for 7 - 10 days

Benzodiazepines - augment the effect of GABA on the GABA-A receptors of lower motor neurons

Diazepam - resource limited settings, survival benefit in children
• compared to barbiturates and chlorpromazine
Midzolam - short-acting, limited evidence of use
Lorazepam - Binds to GABA receptor, improves GABA binding
• No head-to-head trials
• Non-specific dosing to response

Baclofen - GABA agonist
• 10 - 15 mg orally in 2-3 divided doses (Max: 40 mg/day)

Magnesium Sulfate To Treat Spasm
Case Report:

6 Patients Treated
Tetanus: A Reason to Vaccinate
Catie Chatowsky, PharmD
PGY1 Pharmacy Resident

Objectives:
● Identify the signs and symptoms of tetanus.
● Describe common treatments for tetanus.
● Recall the catch-up immunization schedule for tetanus coverage.

Vitals:
● Temp: 101.9 ℉
● BP: 110/69 mmHg
● HR: 88 bpm
● RR: 22 bpm

Physical Exam:
● Eye: PERRLA
● Ears, nose, mouth and throat: Dry oral mucosa.
● Cardiovascular: RRR, No murmur.
● Respiratory: CTAB

Background: Tetanus
Clostridium tetani:
○ Anaerobic gram-positive bacillus
■ Two toxins = tetanospasmin and tetanolysin

● Bacteria in same genus:
  Clostridium difficile, C. perfringens, C. botulinum

At the site of inoculation,
○ tetanus spores enter the body and germinate
○ release tetanospasmin into the bloodstream

● Via retrograde axonal transport: toxin travels to neurons

Clinical Symptoms Continued
Autonomic dysfunction:
● Tachycardia, hypertension, and sweating
○ Episodes of rapidly alternating with bradycardia and hypotension are common
 ● Associated with generalized tetanus
○ Sx occur when brainstem is affected by toxin

Tetanus Classification
4 types:
1. Generalized
   a. Muscles of the entire body
   b. Leads to opistotonus
2. Neonatal
   a. Generalized form (< 1 month of age)
3. Local
   a. Regional muscle spasm
4. Cephalic
   a. Localized tetanus within the head region

Acute Therapy:
Tetanus Immunoglobulin (TIg):
● Treatment or prophylaxis
○ After traumatic wound: non-immunized or suboptimally immunized persons

Botulism Toxin To Treat Spasm
Case Report:
6 Patients Treated

Botulism Toxin To Treat Spasm
The Vaccine Discussion

Aluminum
Typically, adults ingest 7 to 9 milligrams of aluminum per day.

Do We Still Need to Vaccinate After a Patient has acquired Tetanus?
● Poorly Immunologic
  ○ Inadequate immune response after natural infection

● Important to get full primary course of immunization

For an unvaccinated patient, 7 years of age or older, how do you complete a full primary course of immunizations to cover tetanus?
   A. One TDaP, until Td Booster in 10 yrs
   B. Two TDaPs, until Td Booster in 10 yrs
   C. One DTaP, two TDaPs, until Td Booster in 10 yrs
   D. Three TDaPs, until Td Booster in 10 yrs

Vaccination Timeline

Why Must All Individuals Be Vaccinated:
● Life-Saving
● No herd immunity effect
Return to Patient Case

Blood Cultures:
- No Growth (Final)

Chest Radiograph:
- Impression:
  - Features of viral lower respiratory tract infection
  - No acute consolidative pneumonia

8 y.o., 26.9 kg

Attendance Code:

Text attendance code to 413-200-2444
Code: JASDEK