TETANUS
Titles.

1) Introduction.
2) Causative organism.
3) Epidemiology
4) Pathogenesis.
5) Clinical Features.
6) Complications.
7) Diagnosis.
8) Medical Management.
9) Wound Management.
10) Prevention (Tetanus Toxoid).
Definition

- Acute Fatal disease
- caused by an **Exotoxin By Clostridium tetani**.
- Prevented by immunization with “**Tetanus Toxoid**”
- It is characterized by
  - Generalized rigidity
  - Convulsive spasms of skeletal muscles
  - Lockjaw and neck stiffness
Characteristic of Clostridium tetani

- Gram-positive
- Terminal spore = “Drumstick” appearance.
- Sensitive to heat
- **Anaerobic Rod**
- **Not survive in the presence of oxygen.**
- widely distributed
  - **Soil**
  - intestines and feces of Animal.
Mode of Transmission

✓ Contaminated wounds

✓ Tissue injury, e.g.
  ✓ Post Abdominal Surgery
  ✓ Burns
  ✓ Deep puncture wounds, crush wounds
  ✓ Otitis media, dental infection
  ✓ Animal bites
  ✓ Abortion and pregnancy
Tetanus is not contagious from person to person.

It is the only vaccine-preventable disease that is “Infectious but not contagious”.

Incubation Period: 8 Days (3-21 Days)
Host Factors:

- **Age**: 5-40 years, New born baby, female during delivery or abortion
- **Sex**: males > females
- **Occupation**: Agricultural workers are at higher risk
- **Rural > Urban areas**.
- **Immunity**: Herd immunity (community immunity) does not protect the individual.
- **Environmental and social factors**: Unhygienic custom habits, Unhygienic delivery practices.
Pathogenesis

- Clostridioides tetani enters through a wound.
- In anaerobic conditions, start to produce toxin
- Disseminated via blood and lymphatics.
- Through motor nerves reach to the spinal cord
- Toxin reaches the CNS.
- Toxins act at several sites within the CNS,
  - Peripheral motor end plates
  - Spinal cord & Brain
  - Sympathetic nervous system.
Pathogenesis

- Tetanus toxin interferes with release of inhibitory neurotransmitters.
- Blocking inhibitory impulses.
- Leads to unopposed muscle contraction.
- Spasm & Seizures may occur
- Autonomic nervous system may also affected.
- No loss in sensory function
- Very painful = Affects ability to control pain.
Mechanism of Action of Tetanus Toxin
Incubation Period

• Toxin travels = 7.5 -25 cm/day.
• Reach The CNS = 2 -14 days.
• Incubation = 3 to 21 days, usually about 8 days.
• Shorter Incubation period = Poor Prognosis.
• In neonatal tetanus = 4 to 14 days (Aver. 7 days)
Clinical Features With Type of Tetanus

1. Local Tetanus
2. Cephalic Tetanus
3. Generalized Tetanus
Local Tetanus

- Uncommon
- Persistent contraction of muscles in the same anatomic area of the injury.
- Local tetanus may precede the onset of generalized tetanus but is generally milder
- Only about 1% of cases are fatal.
Cephalic Tetanus

- Rare
- Commonly after
  - Otitis media
  - Head injury
- Involvement of the cranial nerves (facial area).
Generalized tetanus

- Most common type (about 80%)
- Neonatal tetanus is a form of generalized tetanus
- Usually presents with a **descending** pattern.
- Sequence of Events
  1. Lock Jaw
  2. Neck Stiffness
  3. Difficulty in Swallowing
  4. Muscle Rigidity
  5. Spasm
Risus Sardonicus

Spasm of Facial muscle
Opisthotonos

Spasm of extensor muscle of Head Back

That contractions may cause bone fractures.
Neck rigidity & retraction.
Unfortunately, the affected individual is conscious throughout the illness, but cannot stop these contractions.
Tetanus Complication

- Respiratory Spasm & Laryngospasm
- Vertebra Fracture
- Hypertension
- Aspiration Pneumonia
- Death
Laboratory diagnosis

- No laboratory findings
- Entirely on clinical features
- Does not depend upon bacteriologic confirmation.
- C. tetani is recovered from the wound in only 30% of cases
- And can be isolated from patients who do not have tetanus.
Diagnostic tests for tetanus

**Spatula Test:**

- Posterior pharyngeal wall is touched with a spatula
- Reflex spasm of the masseters
- Indicates a +ve.test.
- 94 % sensitivity
- 100 % specificity.
Scare for Severity and Prognosis of tetanus

One point for each of the following 7 items:

• **I.P. < 7 days**
  (period between injury and 1\textsuperscript{st}. symptom.)

• **Period of onset < 48 hours**
  (period between 1\textsuperscript{st}. Symptom and 1\textsuperscript{st}. Spasm.)

• **Acquired from** burns, surgical wounds, compound fractures, or septic abortion.

• **Addiction** (Narcotics)

• **Generalized tetanus**

• **Temperature** greater than 104°F (40°C)

• **Tachycardia** greater than 120 beats per minute
  (>150 beats per min in neonates)
**Total score** indicates the severity and the prognosis as follows:

<table>
<thead>
<tr>
<th>Score</th>
<th>Severity</th>
<th>Prognosis (mortality rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 1</td>
<td>mild</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>2 - 3</td>
<td>moderate</td>
<td>10 : 20 %</td>
</tr>
<tr>
<td>4</td>
<td>severe</td>
<td>20 : 40 %</td>
</tr>
<tr>
<td>5 : 6</td>
<td>very severe</td>
<td>&gt; 50 %</td>
</tr>
</tbody>
</table>
Treatment

1) Medical Management.
2) Wound Management.
Medical Management

Aim of Treatment:

(1) **Supportive care** (until the tetano-spasmin that is fixed in tissue has been metabolized)
- a: treatment of muscle spasm
- b: prevention of respiratory complications.
- c: prevention of metabolic complications.

(2) **Neutralization** of circulating toxin.

(3) **Elimination** of the source of toxin.
Treatment

1. Admit patients to the (ICU).
2. Maintain a **dark and quiet room** for the patient.
3. Avoid unnecessary procedures.
4. **Prophylactic intubation** with succinylcholine
5. **Tracheostomy**
6. **Tetanus immune globulin** (passive immunization).
7. help remove unbound tetanus toxin
8. but it cannot affect toxin bound to nerve endings.
9. single IM. dose of 3000-5000 units
10. Some part of the dose infiltrated around the wound if it can be identified.
11. Because the half-life of TIG is 25 days, repeated doses are not needed.
Drugs

**Antibiotics**
- Penicillin G
- Metronidazole
- Doxycycline

**Anticonvulsants**
Sedative-hypnotic agents are the mainstays of tetanus treatment.
- Diazepam (Valium): **Skeletal muscle relaxant**
- Phenobarbital: used to prolong effects of diazepam.
- Baclofen (Lioresal) a physiological GABA agonist
Differential Diagnoses

1. Rabies
2. Meningitis
3. Stroke
4. Encephalitis
5. Subarachnoid Hemorrhage
6. Hypocalcemia
**Wound Management**

- All wounds should be cleaned with H2O2 & antiseptic.
- Necrotic tissue and foreign material should be removed.
- Passive immunization.
- Active immunization.
PREVENTION
PREVENTION:

• Active Immunization
• Passive Immunization
• Active and passive Immunization.
Active Immunization by using tetanus toxoid