TETANUS

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SYNOPSIS:

- Definition
- Epidemiology
- Etiology
- Pathophysiology
- Classification
- Clinical Manifestation
- Diagnosis
- Differential Diagnosis
- Medical Management

DEFINITION

Tetanus is derived from greek word (**Tetanus to Contract**). Tetanus is an acute, often fatal, bacterial disease caused by an exotoxin produced by bacterium Clostridium tetani.

It is characterised by generalized rigidity, painful paroxysmal spasms of voluntary muscle such as facial muscles, muscles of back and neck & those of lower limbs and abdomen.

It usually involves in jaw (lock jaw), neck and then becomes generalized. It can interfere with the ability to breathe, eventually causing death.

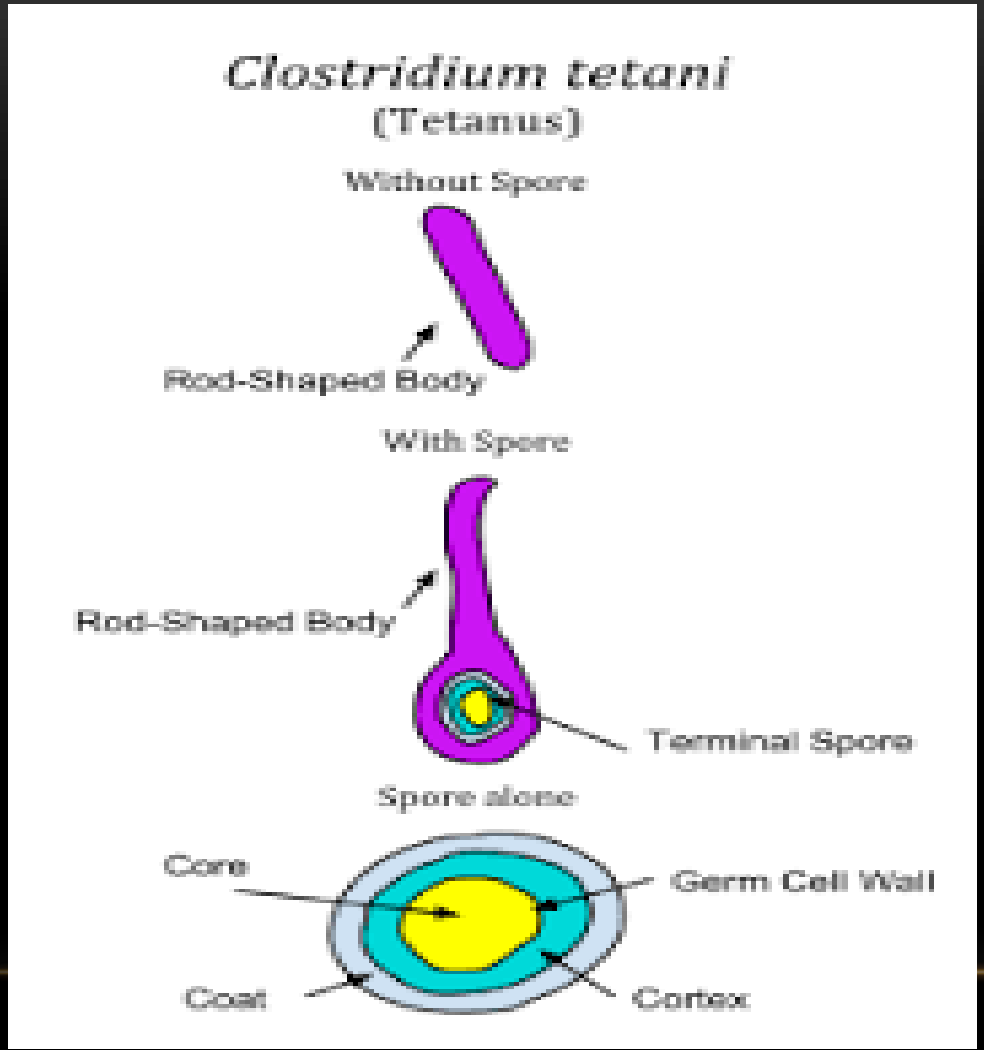
EPIDEMIOLOGY

- It was first described in Egypt over 3000yrs ago.
- It occurs worldwide but more prevalent in developing countries.
- It continues to cause approximately 213,000–293,000 deaths worldwide each year, 180,000 of which have been reported in neonates.
- Neonatal tetanus is the second leading cause of death. Half of the deaths from tetanus occurs in children.

- In India, tetanus is endemic and remains an important health problem.
- The annual incidence of neonatal tetanus is 1.74/1000 live births. The exact incidence of non-neonatal tetanus in India is not known.
- Higher incidence in males than females.

ETIOLOGY

- C.tetani is a slender, gram positive, anaerobic rod that may develop a terminal spores.
- The terminal spores are in drumstick appearance.
- It Founds primarily in the soil and intestinal tract of animal and humans.
- The organism is very sensitive to heat and cannot survive in the presence of oxygen.


Clostridium tetani
(Tetanus)
Without Spore
Rod-Shaped Body
With Spore
Rod-Shaped Body
Terminal Spore
Spore alone
Core
Germ Cell Wall
Coat
Cortex

- It cannot survive autoclaving at 249.8^{0}F (121^{0}C) for 20 minutes.
- C. tetani produces two exotoxins, namely tetanolysin and tetanospasmin. The tetanospasmin is a neurotoxin and causes the clinical manifestation of tetanus.
- Incubation period of the bacteria is usually 3 – 21 days, it ranges between 0 – 60 days.

MODE OF TRANSMISSION

- Tetanus is infectious but not contagious (Not spread from person to person).
- It primarily transmitted from contaminated wounds with clostridium tetani spores.
- A tiny breach in skin or mucosa. Example: skin abrasion, puncture wounds, burns, human bites, animal bites and stings, unsterile surgery, dental extractions, unsterile cutting of umbilical cord, otitis media, chronic skin ulcers, eye infections and gangrenous limb.

HOST FACTOR

- Age: The disease of active age (5 – 40 years), New born babies, females during delivery or abortion.
- Sex: Higher incidence in males than females.
- Occupation: Agricultural workers are at higher risk.
- Environmental factor: Unhygienic custom habits, Unhygienic delivery practice.

PATHOPHYSIOLOGY

Clostridium tetani enters into the human body through wounds or unsterile surgical procedure

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Spores of the bacteria germinate in anaerobic condition.

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Toxins are produced and disseminated through blood and lymphatic circulation

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Toxins act at various sited in the nervous system including the peripheral motor end plate, spinal cord, brain and sympathetic nervous system.

Toxins gain access to the CNS via retrograde axonal transport in motor nerves.

Then the toxins moves into the presynaptic inhibitory interneurons with resulting inhibition of release of inhibitory neurotransmitter (GABA in brain, Glycine in Spinal cord)

This results in heightened muscular activity.

Loss of glycine inhibition in the intermediolateral grey matter of the spinal cord results in increased sympathetic activity.

Reduction in release of acetylcholine from motor neurons may results in paralysis of cranial nerve.

CLASSIFICATION

- Localized tetanus: Manifests with muscle spasms at or near the infected wound.
- Generalized tetanus: Most common & severe form affects all the skeletal muscle.
- Neonatal tetanus: It is similar to generalized tetanus except that it affects neonates.
- Cephalic tetanus: affects one or more muscle in face. Lock jaw occurs that can easily progress to generalized tetanus

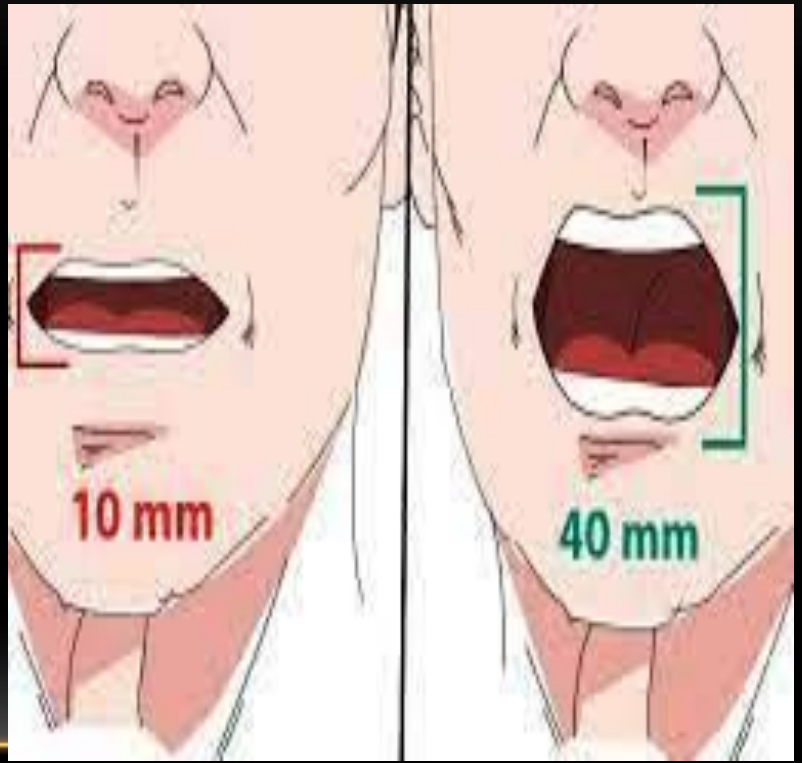
CLINICAL FEATURES

Generalized tetanus:

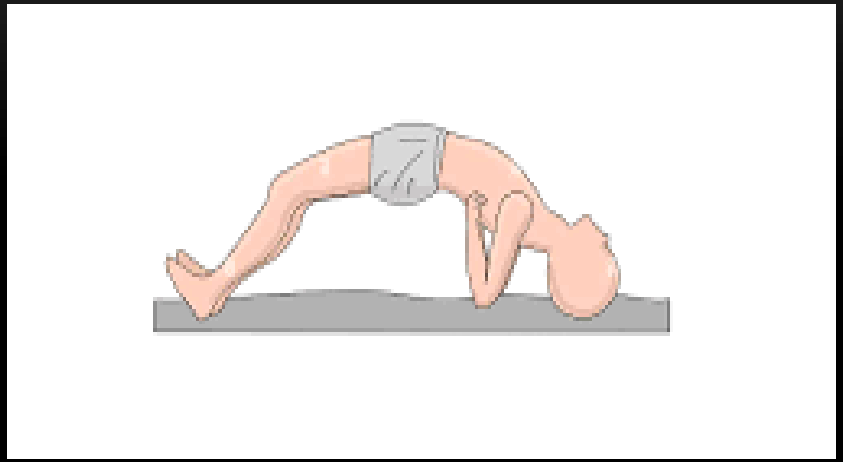
- Risus sardonicus or fixed sneer.
- Trismus (lockjaw)
- Opisthotonus (Extension of the lower extremities, flexion of the upper extremities & arching of the back).
- Neck rigidity
- Rigidity of the axial muscles (Prominent involvement in the neck and back muscle).

RISUS SARDONICUS

TRISMUS (LOCK JAW)



OPISTHOTONOS



- Stiffness of the limb muscles.
- Reflex spasm.
- Paroxysmal contraction of the muscles in response to attempt of voluntary movement and to external & internal stimuli.
- Spasm of deglutition muscle.
- Laryngospasm may leads to asphyxiation.

- Autonomic instability may manifested by,
  - Fluctuation of heart rate and blood pressure.
  - Cardiac arrhythmias
  - Profuse sweating
  - Hyper salivation
  - Hyper pyrexia

Localized tetanus:

- Localized stiffness near or at the site of injury.
- Fixed muscular rigidity

Cephalic tetanus:

- Infection of Para-cranial structures
- Chronic otitis media
- Dental infection
- Trismus
- Cranial nerve palsies
- Facial paresis.

- Dysphagia
- Abnormal ocular movement
- Trochlear nerve palsy
- Nystagmus
- Focal cranial neuropathies

DIAGNOSIS

- There is no exact diagnostic procedure for tetanus.
- Diagnosis is entirely clinical.
- Laboratory studies may demonstrate a moderate peripheral leukocytosis.
- Serum antitoxin level 0.01u/ml or greater is make the diagnosis of tetanus unlikely.
- CSF study findings are usually within normal limits.

SPATULA TEST:

- This simple test involves touching the oropharynx with a spatula or tongue blade.
- Usually, this test causes a gag reflex and the patient tries to expel the spatula. (This means tested negative)
- If the patient develops a reflex spasm of the masseters muscle and bite the spatula indicate tested positive. (Only seen in tetanus)

SPATULA TEST

DIFFERENTIAL DIAGNOSIS

- Neuroleptic malignant syndrome
- Acute Dystonia
- Stiff person syndrome
- Hypocalcemic tetany
- Meningoencephalitis
- Dental abscess
- Hysteria

MEDICAL MANAGEMENT

The principles of management are:

1. Elimination of source of toxin
2. Toxin neutralization
3. Control of muscular rigidity and spasm
4. Supportive care

1. **Elimination of source of toxin:**

- Wound exploration, cleansing and debridement to reduce the bacterial load.
- Antibiotic therapy: Iv Metronidazole 500mg / 8hrs
- IV penicillin

2. **Toxin Neutralization:**

- Neutralization of circulating toxin is done by anti tetanus serum at 10000 IU after negative test dose.
- IM human immunoglobulin 500 IU.

3. Control of spasm:

- Benzodiazepines – Diazepam, Lorazepam, Midazolam.
- Barbiturates – IV phenobarbital (Second line drug).
- Neuromuscular blockage: Atracurium, Vecuronium (In case of severe spasm and respiratory depression).

4. Supportive care:

- Autonomic instability can be treated with alpha and beta blockers – Labetalol.

- DVT Prophylaxis

IMMUNIZATION SCHEDULE AFTER DISCHARGE

- IM TT 0.5ml
- Repeat dose is given 6 weeks after 1st dose.
- 3rd dose is given 6 months after 2nd dose.

IMMUNIZATION PROGRAMME FOR TT

- The only reliable immunity against tetanus is achieved by vaccination with tetanus toxoid.
- Tetanus toxoid can be safely given in pregnancy and in immunocompromised individual.
- Tetanus toxoid vaccines are recommended at 10 years of interval throughout adulthood.

❑ Active Immunization:

Combined vaccine:

- DPT vaccine at 6^{th} , 10^{th} & 14^{th} week
- 1^{st} booster dose at 18^{th} month
- 2^{nd} booster dose at 5 – 6 years
- 3^{rd} booster dose at 10 years

❑ Passive Immunization:

A) Human Tetanus HyperImmunoglobulin (HTIG)

- Dose : 250 IU
- Passive protection up to 30 days or more

B) Anti Tetanus Serum (ATS – Equine)

- Dose : 1500 IU
- Injected subcutaneously after sensitivity testing
- Passive protection up to 7 – 10 days

COMPLICATIONS

- Laryngospasm
- Fracture of spine
- Pulmonary Embolism
- Aspiration Pneumonia
- Cardiac arrest

PREVENTION

- Appropriate wound care and immunization
- Proper vaccination
- Administration of booster dose in every 10 years.
- Proper nutrition and hygiene in the hospital.
- Use of sterile equipments during the surgical procedures.