General surgery department of SGMU
Lecturer –ass. Khilgiyaev R.H.

# TETANUS

- **Toxin-mediated disease characterized by severe uncontrolled skeletal muscle spasms**
- **The major risk to life is related to spasms of the muscles of respiration, which can lead to hypoxia and death.**

# Epydemyology

- C. tetani bacteria and spores are anywhere, and tetanus is endemic throughout the world.
- It is more common in warm, damp climates and relatively rare in cold regions.
- More than 70% of tetanus cases occur after an acute injury causes a break in the skin.
- The most common portals of entry for the organism are puncture wounds, lacerations, and abrasions.
- Most cases occur in developing countries, especially in Africa, Asia, and South America, in neonates and children and are related to inadequate immunization standards and poor hygiene.

# Etiology

- is an anaerobic, motile, spore-forming, gram-positive, thin, rod-shaped organism.
- is found in soil, dust, and the feces of animals and humans
- The bacterium exists in its sporulative form in the environment.
- Vegetative forms are highly susceptible to heat and other adverse environmental conditions, but spores are hardy and can survive in soil for months to years.
- Spores are resistant to heating and chemical disinfectants.
- Development of clinical tetanus requires a portal of entry for the infecting spores

# Predisposing factors

- **Conditions that promote germination of the spores, growth of the organism, and toxin production must exist in the infected tissue in the immunologically susceptible host.**
- **Wound conditions include the presence of damaged or devitalized tissue, foreign bodies, or other bacteria.**
- **These conditions reduce the oxidation-reduction potential of the tissue and allow spores to revert to the vegetative form of the bacteria.**
- **In this state, the bacilli can produce the toxins that cause the clinical illness.**

# toxins

- **C. tetani produces two exotoxins: tetanospasmin, and tetanolysin.**
- **Tetanospasmin causes the symptoms and signs of clinical tetanus**
- **Tetanolysin has no clinical significance.**

# spread of toxin

- **Tetanospasmin travels from the site of infection by hematogenous and axonal spread to the spinal cord, brain, motor end plates of skeletal muscle, and sympathetic nervous system.**
- **It cause excessive, uncontrolled muscle activity.**
- **Simultaneous spasm of agonist and antagonist muscle groups occurs.**
- **The clinical manifestations include dysrhythmias and wide fluctuations in blood pressure.**

# Clinical Features

Four types of clinical tetanus

- generalized
- cephalic
- localized
- neonatal.

# Generalized tetanus

- **is the fully developed state of skeletal muscle hypertonicity and is the most common and severe form of the disease.**
- ***Trismus* is the presenting symptom in most patients and is caused by increased masseter muscle tone.**
- **Patients may complain of lockjaw and present to a dentist or oral surgeon. As the other facial muscles become involved, the characteristic *sardonic smile* (*risus sardonicus*) appears.**
- **Other early symptoms include irritability, weakness, myalgia, muscle cramps, dysphagia, hydrophobia, and drooling.**
- **The muscle rigidity increases as the disease progresses.**
- **The time from an initial symptom to the first muscle spasm is called the onset period.**
- **A shorter onset period is  a poorer prognosis.**

# Opisthotonos

- **In the most severe form of tetanus, muscle rigidity becomes generalized and muscle spasms may be caused by external stimuli (noise, light, touch) or occur spontaneously.**
- **Opisthotonos develops because posterior trunk and extremity muscles are stronger than anterior muscle groups.**
- **Spasm of laryngeal and respiratory muscles can lead to ventilatory failure and death.**
- **Autonomic dysfunction is manifested by tachycardia, hypertension, temperature elevation, cardiac dysrhythmias, vasoconstriction, and diaphoresis.**

# Localized tetanus

- **is a form of the disease characterized by persistent muscle spasms in proximity to the site of inoculation.**
- **Symptoms may be mild or severe. Although local tetanus may progress to generalized disease, most cases do not.**
- **This form of illness may be present for weeks to months before resolution.**

# Neonatal tetanus

- **is a form of generalized tetanus that occurs almost exclusively in underdeveloped countries, where maternal immunization is inadequate and contaminated material is used to cut and dress the umbilical cords.**
- **The incubation period is short, with symptoms beginning during the first week of life.**

# Respiratory complications

- Acute respiratory failure
- Asphyxia results from the hypertonicity of muscles of the upper airway and diaphragm.
- Inability to clear secretions can lead to atelectasis or bronchiolitis.

# Cardiovascular complications

- **are related to hyperactivity of the sympathetic nervous system:**
  - **dysrhythmias**
  - **vasomotor instability**
  - **hypertension**
  - **tachycardia**
  - **myocarditis**

# fractures

- **Muscle spasms produce subluxations and fractures of the spine, long bone fractures, and dislocations of the shoulder and temporomandibular joints.**

# Vessel and GI complications

- **Hyperthermia is caused by muscle spasms and sympathetic hyperactivity.**
- **Stasis can lead to venous thrombosis and pulmonary embolism.**
- **Gastrointestinal (GI) complications include peptic ulcer, ileus, intestinal perforation, and constipation.**

# mortality

- **Death is a result of respiratory failure, dysrhythmia, pneumonia, pulmonary embolus, or secondary infections.**
- **The overall mortality rate for generalized tetanus ranges from zero to 50%.**

# Diagnosis

- **Because wound cultures for C. tetani are positive in only one third of cases, they are of limited value as a diagnostic tool.**
- **Tetanus is essentially a clinical diagnosis.**

# Management

- aggressive supportive care
- administration of antitoxin
- elimination of toxin production
- active immunization
- If any sign of airway compromise develops, the patient should be intubated.
- All intubated patients should be considered for tracheostomy .

# Treatment

- **Benzodiazepines reduce muscle spasms and are also sedatives.**
- **If benzodiazepines are not effective in reducing the spasms, myorelaxants can be used.**
- **Barbiturates and chlorpromazine have also been recommended as muscle relaxants.**
- **Penicillin, tetracycline, erythromycin, and metronidazole are all effective against C. tetani.**

# Specific therapy

- tetanus immunoglobulin (TIG)
  - TIG does not neutralize toxin already present in the nervous system, nor does it treat any existent symptoms. TIG neutralizes any circulating extraneuronal toxin or toxin at the site of production and reduces the mortality rate
  - is administered intramucularly in total dose 50.000U on course (initially 10000 , then 5000 daily)
- Tetanus toxoid
  - are given intramucularly at 0,5 ml three times each 5 days
- antitetanus serum
  - is administered in total dose 200.000-300.000U, daily dose 100.000-200.000U

# Surgical treament

- **The wound should be debrided and cleansed, and foreign bodies should be removed**

# Specific tetanus prophylaxis

- Sheduled immunisation is indicated for the following: the military, builders
  - 0,5 ml of toxoid are given  twice a month;
  - Revaccination is done after one year - 0,5 ml of toxoid are given
  - repeated revaccination is done only after 5 years
- emergent prophylaxis
  - *previously immunised* are given 0,5 ml of toxoid
  - *non-immunised* are given 1 ml of toxoid and 3000 U of antitetanus serum or 600 U of tetanus immunoglobulin

# prophylaxis

- **Tetanus prophylaxis should be updated for all patients who come for management of a wound.**
- **Patients with an unknown or uncertain immunization status should be considered to have no previous tetanus immunization.**
- **The only contraindication to tetanus toxoids is severe hypersensitivity reaction after a previous dose.**
- **The most common side effects are minor: local swelling, pain, erythema, pleuritis, fever, nausea, vomiting, malaise, and nonspecific rash**
- **Serious anaphylactic reactions rarely occur.**
- **TIG is not contraindicated in pregnancy.**