**Diphtheria**

**Definition:**

* Diphtheria is an acute, toxin-mediated disease caused by toxigenic *Corynebacterium diphtheriae*
* There are three biotypes — gravis, intermedius, and mitis
* The most severe clinical type of this disease is associated with the gravis biotype, but any strain may produce toxin
* It’s a very contagious and potentially life-threatening bacterial disease.
* It’s a localized infectious disease, which usually attacks the throat and nose mucous membrane.
* The toxin is responsible for the major complications of myocarditis and neuritis, and can also cause low platelet counts (thrombocytopenia) and protein in the urine (proteinuria).

**Sources of infection**

**Patients:** Transmission time is variable, usually persist 12 days or less **Asymptomatic carriers** may be up to 10-20% during outbreaks in the past. Most of them were transient carriers (less than 2 weeks), but chronic carriers may shed organisms for 6 months or more.

***Transmission***

* Transmission is most often person-to-person spread from the respiratory tract (by small droplet when coughing or sneezing).
* Rarely, transmission may occur from skin lesions or articles soiled with discharges from lesions of infected persons.

**Clinical manifestations:**

* The incubation period of diphtheria is 2-4 days (range, 1-7 days).
* This disease can involve almost any mucous membrane.
* The major sign is pseudomembrane. The typical pseudomembrane is adherent to the tissue, and forcible attempts to remove it cause bleeding.

**For clinical purposes**, it is convenient to classify diphtheria into four categories depending on the site of disease (or pseudomembrane).

1. ***Pharyngeal diphtheria:***

It’s the most common type, >80%.

The sites of infection are the tonsils and the pharynx.

Infection at these sites is usually associated with substantial systemic absorption of toxin.

* ***Mild type:***

**Symptoms:** malaise, sore throat, anorexia, and low-grade fever.

Within 2-3 days, small patches of white pseudomembrane on the tonsils are found. Often occurs in outbreaks and is easily misdiagnosed.

* ***Ordinary type:***

**Symptoms**: malaise, sore throat, anorexia, vomiting and middle-grade fever.

Typical adherent, bluish- or greyish-white pseudomembrane forms on the congested tonsils.

With lymph nodes enlargement in the submandibular areas of neck

* ***Grave type:***

Serious early symptoms, high-grade fever.

Skin becomes pale, tachycardia; blood pressure may be normal or slightly depressed (Shock).

Large, thick pseudomembrane, and greyish-green or black in color if there has been bleeding, covering the tonsils, uvula, and some soft palate, odoriferous in mouth.With enlarged lymph nodes in the submandibular areas of neck.

* ***Extra-grave type***

Tachycardia, tachypnea, depressed blood pressure.Highly congested tonsils and pharynx.

The pseudomembrane is larger than that of grave type, black in color.

Extensive pseudomembrane formation may result in respiratory obstruction.

Patients develop marked edema of the submandibular areas and the anterior neck along with lymphadenopathy, giving a characteristic “bullneck” appearance

***Complications***, include myocarditis and thrombocytopenia may occur.

May even die within 6 to 10 days

1. ***Laryngeal diphtheria:***

Laryngeal diphtheria can be either an extension of the pharyngeal form (often) or the only site involved (rarely).

Symptoms include mild fever (with little absorption of toxin), dyspnea, hoarseness, and a barking cough.

The pseudomembrane can lead to airway obstruction, coma, and death.

1. ***Anterior nasal diphtheria:***

The clinical symptoms of this disease is usually fairly mild because of apparent poor systemic absorption of toxin in this location.

1. ***Cutaneous and Other site diphtheria:***

Skin infections are quite common in the tropics and are probably responsible for the high levels of natural immunity found in these populations.

The skin disease appears to be less than in other forms of infection.

Other sites of involvement include the mucous membranes of the conjunctiva and vaginal area, as well as the external auditory canal.

**Complications**

Most complications of diphtheria, including death, are attributable to effects of the toxin.

The most frequent complications of diphtheria are myocarditis and neuritis

***Laboratory findings:***

**Routine examination**

Leukocytosis, neutrophil is dominant.

Low platelet count (thrombocytopenia), rise profiles of the serum enzyme tests and proteinuria were found in serious cases.

**Bacteriological examinations**

Smear and gram stain can found C. diphtheriae

Fluorescent antibody-stain can found toxigenic C. diphtheriae

C. diphtheriae can be cultured from the swabs from nose, pharynx or other sites.

**Immunological examinations:**

If diphtheria bacilli are isolated, they must be tested for toxin production by ELISA or Elek test.

**Treatments**

* Strict isolation
* Use antitoxin and antibiotics for neutralization of free toxin, elimination of further toxin production and to control local infection.
* ***General measures***

Relax on bed for more than 3 weeks, 4-6 weeks for patients with myocarditis.

Provide adequate energy and nutriments

* ***Diphtheria antitoxin***

It will not neutralize toxin that is already fixed to tissues, but will neutralize circulating toxin.Early use will prevent progression of disease.

Respiratory support and airway maintenance should also be administered as needed. (Pseudomembrane shedding often happens during disintoxication)

* ***Antibiotics***

**Erythromycin** (orally or by injection) for 14 days

**Procaine penicillin G** given intramuscularly for 14 days

Patients with allergies to penicillin G or erythromycin can use rifampin or clindamycin

The disease is usually not contagious 48 hours after antibiotics are used.