Anthrax

Anthrax is an acute bacterial disease usually affecting the skin, and rarely involving the respiratory or intestinal tracts. Most forms of the disease are lethal. Anthrax affects both humans and other animals. Anthrax has an acute onset characterized by several clinical forms. These include:

1. Localized form (cutaneous): skin lesion usually on an exposed part of the body such as the face, the neck or arm, evolving over 7 days from a papular through a vesicular stage, to a depressed black eschar invariably accompanied by edema that may be mild to extensive.

2. Systemic forms

2.1. pulmonary (inhalation), characterized by brief prodrome resembling acute viral respiratory illness, followed by rapid onset of hypoxia, dyspnea, and high temperature , with Chest X-ray evidence of mediastinal widening.

2.2. Gastro-intestinal: characterized by abdominal distress, with nausea, vomiting, anorexia and followed by fever.

2.3. Meningeal: acute onset of high fever possibly with convulsions, loss of consciousness, meningeal signs and symptoms, commonly noted in all systemic infection.

Case classification:

1. Suspected case: A case that is compatible with the clinical description and has an epidemiological link to confirmed or suspected animal cases or contaminated animal product.

2. Probable case: A suspected case that has a positive reaction to allergic skin test (in non-vaccinated individuals)

3. Confirmed case: Positive serology (PCR, IFAT, ELISA)

Laboratory criteria for diagnosis:

1. Isolation of Bacillus anthracis from a clinical specimen (blood, lesions, discharges).

2. Demonstration of B. anthracis in a clinical specimen by microscopic examination of stained smears (vesicular fluid, blood, cerebrospinal fluid, pleural fluid, stools).

3. Positive serology (ELISA, Western blot, toxin detection, chromatographic assay, fluorescent antibody test (FAT).

Note: It may not be possible to demonstrate B. anthracis in clinical specimen if the patient has been treated with antimicrobial agents.

Infectious agent

Bacillus anthracis, a gram-positive, encapsulated, spore forming, non-motile aerobic rode.

Agricultural anthrax occurs especially among veterinarians, agricultural workers and butchers, and industrial anthrax, resulting from exposure to contaminated sheep wool or goat hair that are processed into yarns used in the textile and carpet industry, as well as cattle hides that are processed into leather goods, or bones used for the manufacture of gelatin and/or fertilizer.

Reservoir

Dried or otherwise processed skins and hides of infected animals may harbor spores for years. Spores also remain viable in contaminated soil for many years.

1.2.5 Mode of transmission

1. Through skin lesions by contact with tissues of infected animals (cattle, sheep, goats, etc.)

2. Gastrointestinal anthrax: through ingestion of contaminated food (uncooked meat) or inhalation of spore-laden dust.

1.2.6 Incubation period

Most cases occur within 2-7 days of exposure; however, an incubation period of up to 60 days is possible.

1.2.7 Period of communicability

There is no evidence of direct spread from person to person. Articles and soil contaminated with spores may remain infective for years.

1.2.8 Susceptibility and resistance

The case fatality rate of cutaneous anthrax usually is about 20% if untreated. Systemic infection resulting from inhalation causes a case fatality rate of 100% and gastrointestinal causes death in 25% to 75 % of cases, if untreated. Recovery is usually followed by prolonged immunity.

1.2.9 Methods of control

1.2.9a Preventive measures:

• Educate employees who are handlers of potentially infected articles in the proper care of skin abrasions.

• Ensure proper ventilation in hazardous industries and use of protective clothing.

• Sterilize hair, wool or hides, bone meal or other feed of animal origin prior to processing.

• Use vaporized formaldehyde for terminal disinfection of textile mills contaminated with B. anthracis.

• Deeply bury carcasses with quicklime at site of death, if possible. Do not necropsy or bum on open field.

• Decontaminate soil or discharges with quicklime, or preferably bury deeply with carcass.

• Vaccinate all animal at risk, and revaccinate annually.

1.2.9b Control measures

• Treatment of the patient (penicillin is drug of choice, tetracycline, erythromycin, chloramphenicol, ciprofloxacin could be used).

• Arrange isolation of patient in hospital, soiled articles require pressure steam sterilization or incineration.

• Contacts tracing.

1.2.10 Management of the disease

1.2.10a Mild uncomplicated cases

 In mild uncomplicated cases of cutaneous anthrax, penicillin V, 500 mg, taken orally every 6 hours for 5-7 days is adequate, but the treatment usually recommended is 3 to 7 days of intramuscular procaine penicillin, 600 mg (1 million units), every 12.24 hours or intramuscular benzyl penicillin (penicillin G), 250 000 units at 6 hourly intervals.

 Cutaneous lesions usually become sterile within the first 24 hours of such regimens but, although early treatment will limit the size of the lesion, it will not alter the evolutionary stages it must go through.

1.2.10b Severe or potentially life-threatening cases

 In severely affected patients or when pulmonary or gastrointestinal anthrax is suspected, the initial treatment is penicillin G, 1200 mg (2 million units) per day by infusion or by slow intravenous injection (<300 mg/min) every 4-6 hours until the patient’s temperature returns to normal; at this point treatment should continue in the form of intramuscular procaine penicillin administered as described above. Streptomycin, 1.2 g per day intramuscularly, may act synergistically with penicillin.

 General measures for treatment of shock may be life saving since death is due, at least in part, to toxin-induced shock. Intubation, tracheotomy or ventilatory support may be required in the event of respiratory problems, and vasomotor support with dopamine may be necessary when there is hemodynamic instability.

 Primary hematological, renal or liver function disorders are not generally seen.

1.2.10c Alternatives to penicillin

 In the event of allergy to penicillin, several antibiotics are effective alternatives, including tetracyclines, chloramphenicol, gentamicin and erythromycin. Of the tetracycline family, tests in animals have indicated doxycycline is very effective and that the quinolone, ciprofloxacin may also be suitable.

 Trimethoprim is not effective.

Note: Coordination between Agriculture and Health Ministries is essential.

Ref: WHO Initiative for Vaccine Research (IVR): Zoonotic diseases, updated 2009. http://www.who.int/vaccine\_research/diseases/zoonotic/en/index1.html