Chapter 27 Wound Infections

Summary Outline

27.1 **Wounds** expose components of tissues to which pathogens specifically attach.

A. **Healing**: Wounds heal by forming **granulation tissue** that normally fills the defect and then contracts to minimize scar tissue.

B. **Thermal burns** often present large areas of dead tissue devoid of competing organisms and body defenses providing ideal conditions for microbial growth.

C. Wound **abscess formation localizes an infection** within tissue to prevent its spread. An abscess involves a collection of **pus**, which is **composed of leukocytes, components of tissue breakdown and infecting organisms**.

D. **Anaerobic conditions** are likely to occur in **wounds containing dead tissue** or **foreign material**, and **those with a narrow opening to the air**. These conditions permit infection by particularly dangerous pathogens.

27.2 **Common bacterial wound infections**

A. Possible **consequences of wound infections** include (1) **delayed healing**, (2) **abscess formation** and (3) **extension of infection or toxins** into adjacent tissues or the bloodstream. Infections can cause **surgical wounds to split open**, and they can spread to **create biofilms** on artificial devices.

B. **Staphylococcal wound infections**: Staphylococci, usually ***Staphylococcus aureus*** or ***S. epidermidis***, are the leading cause of wound infections. ***Staphylococcus aureus*** possesses many **virulence factors**; occasional strains release a toxin that causes **toxic shock syndrome**. ***Staphylococcus epidermidis*** is **less virulent** but **can form biofilms** on blood vessel catheters and other devices.

C. ***Streptococcus pyogenes*** (Group A, β-hemolytic streptococcus) (flesh-eaters) causes "**strep throat**," **scarlet fever**, **wound infections** and other conditions. **Necrotizing fasciitis-causing strains produce exotoxin B**, a protease thought to be responsible for tissue destruction.

D. ***Pseudomonas aeruginosa,*** an **aerobic Gram-negative rod** with a single polar flagellum, is an **opportunistic pathogen** widespread in the environment and a cause of both **nosocomial infections** and those acquired outside the hospital.

27.3 Diseases due to anaerobic wound infections

A. **Tetanus** (**Lockjaw**) is an **often fatal disease** characterized by **sustained, painful, cramp-like spasms** of one or more muscles. It is caused by an **exotoxin, tetanospasmin**, produced by ***Clostridium tetani***, a **noninvasive, anaerobic Gram-positive rod**. This toxin renders the nerve cells that normally inhibit muscle contraction inactive by **blocking release of their neurotransmitter**. Tetanus can be prevented by **active immunization with toxoid** (inactivated tetanospasmin).

B. **Gas gangrene (clostridial myonecrosis)** is usually caused by the anaerobe ***Clostridium perfringens***. **Symptoms** begin abruptly with **pain, swelling**, a **thin brown bubbly discharge**, and **dark blue mottling** of the tightly stretched overlying **skin**. The **toxin causes tissue necrosis**; hydrogen and carbon dioxide gases are produced from fermentation of amino acids and glycogen in the dead tissue. Since there is **no vaccine or toxoid, prevention depends on prompt medical care of dirty wounds**. **Treatment depends on urgent surgical removal of dead and infected tissue** and may require amputation.

C. **Actinomycosis (lumpy jaw)** is a **chronic, slowly progressive disease** characterized by **repeated swellings**, **discharge of pus** and **scarring**, usually of the face and neck. The causative agent is ***Actinomyces israelii***, a member of the **normal mouth, intestinal and**

vaginal flora that enters tissues with wounds such as those with dental and intestinal surgery. The organism is **slow growing**; treatment must be continued for weeks or months.

27.4 **Bacterial bite wound infections**

A. ***Pasteurella multocida***, a small Gram-negative rod, can infect bite wounds inflicted by a **number of animal species**. Specific opsonizing antibody permits killing of the bacteria by phagocytes.

B. **Cat scratch disease** is the most common cause of chronic localized lymph node enlargement in children. Caused by ***Bartonella henselae***, it begins with a pimple at the site of bite or scratch, followed by **enlargement of local lymph nodes,** which often become pus-filled. **Most** individuals with cat scratch disease **recover without treatment**.

C. **Streptobacillary rat bite fever** is characterized by **relapsing fevers, head and muscle aches**, and **vomiting**, following a rat bite. A **rash and joint pain** often develop. It is usually caused by ***Streptobacillus moniliformis***, a highly **pleiomorphic Gram-negative rod** that produces cell wall-deficient variants called **L-forms**.

D. **Human bite wound infections** are usually caused by members of the **normal flora** acting synergistically, including **anaerobic streptococci**, **fusiforms**, **spirochetes** and ***Bacteroides* sp**. often with ***Staphylococcus aureus*.**

27.5 **Fungal wound infections** are unusual in economically developed countries except for *Candida albicans* infections of burns and other wounds in individuals receiving antibacterial therapy.

A. **Madura foot** occurs in many impoverished areas of the world where people do not wear shoes.

B. **Sporotrichosis (rose gardeners' disease)** is a **chronic fungal disease** caused by the dimorphic fungus ***Sporothrix schenckii.*** The fungus is distributed worldwide in **tropical and temperate climates** and is usually introduced into wounds caused by **thorns or splinters**. Symptoms include **painless ulcerating nodules that develop along the course of a lymphatic vessel**.