case

by Bio Science

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Case Presentation.

Mary, A 50-year-old woman was excavation manure into her flower farm when she developed a dangerous cut on her right leg. After being taken to the medical center, her wound was disemboweled and stitched. She had received a tetanus injection and was asked to go home. However, she went back to the hospital forty-eight hours later.

Physical Examination.

The temperature of the patient was recorded as 38.2 degrees Celsius, and a pressure of 120/80 mmHg. Upon observation of the wound, its boundaries were red and sensitive to touch, the neighboring tissues were puffy, and infected and odorous ejection was visible. The sensitivity and culture reports showed that the colonization organism was sensitive to amoxicillin. She had taken an Augmentin prescription.

The rationale for a tetanus booster injection.

Tetanus is an illness of the nervous system that causes unwanted contractions of the muscle, especially in the infected area. Research by (Craft et al, 2019) argues that comprehension of the pathophysiology of any disease involves understanding its causes, and effective symptoms, and signs. Tetanus illness is instigated by a bacteria called Clostridium tetani. These spores of the tetanus bacterium are located everywhere in the environment. Later, these spores redevelop themselves into bacteria as they enter the body of the person. Therefore, since Mary was working on her garden, she may have encountered this bacterium in the manure, soil, or dust.

Thus, the rationale for giving a tetanus booster injection to Mary involved ensuring that she had sufficient antibodies that will permit neutralization of the toxin that was produced by the bacterium Clostridium tetani. The doctor must ensure that the patient has completed primary

tetanus immunization. If the examiner determines that the patient is unfamiliar with their immunization history, then an assumption that the patient has received no prior medication is avoided.

Physiological basis for wound observation.

The signs and symptoms of tetanus involve high fever, increased heart rate, nervous system dysfunction, high blood pressure, and sweating. These symptoms usually emerge seven to ten days after the infection. According to the physical observation of the wound, its edges were red and hot to touch, the surrounding tissues were swollen, and purulent and odorous discharge was visible.

Red edges and hot-to-touch wound shows signs of infection. According to the article by (Grubbs, 2021), the process of wound healing involves complicated interactions between the inflammatory mediators and cells. Thus, the tetanus bacterium hinders this interaction from taking place, therefore, hindering wounds from filling on their own since tissues are unable to repair, and the epithelial layer remains unrestored. Pain when touching is the result of the release of chemicals towards the wound, and nerve compression around the injured area, thus causing pain.

Swollen tissues around the edges of the wound are a symptom since it indicates that there is inflammation in the tissues or muscles affected by Clostridium tetani causing external swelling. Moreover, swelling becomes the result of increased movements of white blood cells and fluids into the injured area. Based on an article by (Frykberg et al, 2015), the rationale for observing swollen wounds involve the administration of Tetanus Immunoglobulin to provide a direct antitoxin that ensures the spread of the toxin is contained since people with contaminated wounds are either unvaccinated or have not received the primary dose of tetanus.

Furthermore, the odor was examined in Mary's wound as a symptom. Wound odor occurs as a result of colonization of the Clostridium tetani bacteria in the wound. Research by (Craft et al, 2019), argues that a chemical reaction between the dressing from hydrocolloids and the wound exudate may lead to odor. Thus, this may only be a symptom of any wound infection and does not indicate that the patient has tetanus.

Development and benefits of fever.

Fever is a major symptom of many illnesses, and since the normal body temperature is thirty-seven degrees Celsius, fever refers to a temporary increase in temperature. Fever is caused by different pyrogens and microbes. The breakdown of lipopolysaccharide toxins and proteins may alter the balance of the hypothalamic thermoregulator. Therefore, fever develops when host cells are induced with exogenous pyrogens such as macrophages and leukocytes causing them to give mediators that produce fever such as interleukin-1. These are referred to as endogenous pyrogen. Thus, when bacterial phagocytosis releases endogenous pyrogens into the blood circulation which increases the hypothalamic thermoregulatory temperature through prostaglandin E2. Due to the changes in the setpoint, the hypothalamus initiates behaviors involving heat products such as vasoconstriction and shivering that in turn raise the body temperature resulting in fever (Plaza et al, 2016). The signs and symptoms of fever involve shaking, fatigue, constant sweating, flushed complexion, and elevated temperature.

Moreover, fever plays an important role in the human body. For instance, fever ensures that the body temperature is raised to a temperature that microorganisms cannot survive. Thus, it presents a critical opposition to the development, growth, and replication of bacteria, and viruses by decreasing the level of blood serum of copper, zinc, and iron which are needed for effective replication of microbes. Second, an increase in temperature caused by fever leads to the breakdown

of lysosomes, and the destruction of cells containing the viruses and bacteria thus preventing their transference and replication. Furthermore, increased temperature causes an increase in the number of white blood cells, which ensures that invading microbes are destroyed, and their multiplication halted (Lee et al, 2012).

Sources of Contamination and Modes of Transmission.

The sources of contamination of a wound from bacteria can be either be endogenous or exogenous. Endogenous microbial contamination involves corruption by infectious agents that already exist in the host's body. One of the major internal contamination sources involves bowel perforation. Bowel perforation involves the development of a hole in the bowel wall of the intestinal tract, that leads to an internal wound that may lead to death, sepsis, shock, and organ failure if left untreated (Levack et al, 2014). Thus, when a body becomes infected with its bacteria, it breaks a barrier between the non-sterile and sterile. People that have already undergone surgery, bowel perforation, or chemotherapy may already have an endogenous infection due to the weakened immune system. The presence of a dormant pathogen in the body may be activated again and affect the host, such as in the case of tetanus bacteria Clostridium tetani. Surgical site infection is therefore transmitted through internal preexisting germs, germs in the air, and spread through the wound hindering the healing process.

Exogenous contamination involves intrusion that is not found in the body but outside the body of the individual. Exogenous contamination may either cause a negative or a positive biases in analytical results. One of the major contamination sources involves surgical procedures where the wound become infected after a surgical site infection (Marieb, 1992). A huge number of surgical site infections are caused when an incision becomes polluted with microbes from an opened internal organ. The pathogens are usually introduced into the body through contaminated

surfaces, workers, and devices that compromise the immune system of an individual. For example, individuals with open incisions, and dwelling devices are at a higher risk of getting contaminations. Thus, getting rid of exogenous contamination is solely dependent on the ability to maintain an effective patient environment, through effective hygiene, and decontamination of important surfaces and devices.

Appropriateness of Augmentin.

Augmentin involves a constitution of both clavulanate potassium and amoxicillin (Burchum et al, 2019). Since physical examination showed that the colonization organism was sensitive to amoxicillin, Augmentin as a prescription was the appropriate choice (Lehne et al, 2013). Amoxicillin is an antibiotic responsible for fighting the growth and replication of the bacteria, thus, the colonization process will be reduced. It ensures that bacteria are killed by causing inhibition of the biosynthesis of the peptidoglycan layer of the wall of the bacteria, thus interrupting the effective construction of the wall of the cell leading to their destruction (Evans et al, 2019).

Clavulanate potassium is an inhibitor drug. That is, it ensures that the bacteria do not develop resistance towards amoxicillin. With this combination, Augmentin can reduce the existence of bacteria that are resistant to drugs to ensure that its effectiveness is maintained. Based on research by (Evans et al, 2020), Clavulanate potassium contains Clavulanic acid which increases the spectrum that covers a broad area of species of bacteria.

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