Staphylococcus and a simple scratch and the case of the scraped gardener

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Staphylococcus and a simple scratch

1. **What errors in the initial treatment of the student's injury occurred?  What would you do to avoid this type of infection?  How could it be avoided?**

The errors in the initial treatment of the student’s injury occurred when he did not immediately do to see the nurse and get the wound properly cleaned. He did not attend to the school nurse for a follow up. Then he got diarrhea and vomiting but did not inform his mother instantly. I would straightaway go to see a doctor after the cut on my skin especially the one where it is followed by pain and puss at the site of injury. This type of infection on the hand could be avoided by taking precautionary measures and motivating the kids to keep themselves clean even when they are ill or wounded.

1. **What is the likely infectious agent for this type of infection?**

The likely infectious agent for this type of infection is *Staphylococcus aureus.*

1. **How did the organisms enter the hand of the gardener?**

The bacteria enters the hands of the patient when they touch something with contaminated surface. It can happen when they share each other’s things such as gloves or napkin or having dirty hands with unclean fingernails. As the student was working with the engine, the bacterial strain must have entered his hand during the cut as other people work on the same device. Someone with the infection had used the device and when this student used it and got a cut, the bacteria enter the hand.

1. **What symptoms (three) are indicative of an infection caused by this organism?**

The infections by the *Staphylococcus* can be identified by different types of symptoms that are common with this organism. The occurrence of lumps under the skin with swollen and red head and pus is a common symptom for this infection. They become more painful as they grow in size until they rupture and the pus is drained out of them. These lumps are called furuncle and occur due to the infection in the hair follicle. Other symptoms include the pain in the chest and shortness of breath. It also leads to fever and headache with general bad feeling about health. The wounds caused by this infection take longer to heal (Roque, 2019).

1. **What are recommended treatments for this serious type of infection?  What tests should be done in the clinical laboratory at the hospital to determine the antibiotic to be used?  What treatment should begin immediately?**

In case of Methicillin resistant *Staphylococcus aureus* (MRSA) infection in the skin, treatment begins by draining the infectious site. However, it should not be done without following the proper procedure. The wound should be kept covered with the help of a clean bandage. In case of severe infections, the treatment becomes a little harder. They are treated using the right antibiotic for certain type of infection and it is identified by having some lab tests. These infections become extremely difficult to treat in case they occur within lungs or the blood. It can also become hard to treat the disease in case of people who have prior illnesses and are on other medications. People who have weak immune system are also a threat for the continued treatment of the infection. The antibiotic follow up in these cases often goes beyond weeks, usually it takes 2 to 3 weeks to last the infection. The tests that are conducted in order to determine the type of infection and prescribing the right antibiotics. The sample is collected by using a cotton swab from the site of infection mainly from the open skin rashes and sores. The sample can also be collected from the blood, urine, septum or pus. Then the sample is analyzed under the laboratory procedures in order to identify the specie and the MRSA (Medline Plus, 2019).

Staphylococcus and the case of the scraped gardener

1. **What is the immunization the patient should have received? What is the recommended period for booster shots?**

There are various vaccines that can be provided to the patients in order to protect the patient from other diseases. These vaccinations are; DTaP (Diphtheria, Tetanus and Pertussis), DT (Diphtheria and Tetanus), Tdap (Tetanus, diphtheria and pertussis), and Td (Tetanus and diphtheria). The recommended booster shot is for the use of Tdap or Td and the period of vaccination should be 1 dose of Tdap and then Td booster every ten years (CDC, 2019).

1. **The causative agent for this disease is:** *Clostridium tetani.*
2. **Describe three identifying characteristics of this organism?**

The spores of this bacteria are found everywhere in the environment such as soil, dust, air, water, and manure. The spores are in the vegetative form when they are in the environment but as soon as they enter inside the body, they develop into infectious bacteria. It is an anaerobic, gram positive, rod shaped bacteria. It produces a potent exotoxin which is extremely toxic for the humans. This organism is found mainly in the soil and the intestinal tract of the humans and many other animals. The neurotoxin released by this bacteria enters in the tissue through the site of wounds especially through deep punctures as they provide anaerobic environment (Underwood et al., 2015).

1. **How did the organisms enter the hand of the gardener?**

As this bacterial specie is present in the soil, anyone who works with the plants and weed is at a risk for getting this disease. When the gardener picked the invasive weed without using his gloves, he got gouged up by the tiny thorns. At that moment, the spores present on the weed must have entered his hand. His hands were also contaminated with the dirt and upon the punctured wound by the thorn, the bacteria entered the skin.

1. **What causes the paralysis?**

When the bacteria enters the body, it releases a neurotoxin named as tetanospasmin. When it enters into the bloodstream, it spreads throughout the body and causes several minute symptoms of tetanus. This toxin interferes with the neurons that travel back from the brain to the spinal cord and then towards the muscles. This is the reason that the body gets spasms and stiffness and upon severe production of the toxin, it takes control over the motor nerves and causes the paralysis in the body (Fishman, 2009).

1. **What other organisms belong to this Genus that is medically significant? Describe at least three?**

Other organisms that belong to the genus Clostridium with medical significance are;

* *Clostridium perfringens*

It is a spore forming gram positive bacteria and is mainly present in various environmental sources and in the intestines of humans. It is also found on the raw meat and poultry. Some of its strains are responsible for producing a toxin that causes infection in the intestines. It also causes diarrhea and abdominal cramps and severe kind of food poisoning (CDC, 2018).

* *Clostridium botulinum*

It is an anaerobic bacteria and produces protective spores for survival in poor conditions. It produces a neurotoxin and even the tiniest amounts of its production can cause illness and even death. It can affect the central nervous system and destroy or paralyze the nerve tissues. It is mainly associated with foods like unrefrigerated salsa, baked potatoes stored in aluminum foil, garlic oil, honey and fermented fish (USDA, 2013).

* *Clostridium novyi*

It is an anaerobic, spore forming and gram positive bacteria. It is mainly found in the soil and feces. Type B is the causative agent for big heads and black disease or infectious necrotic hepatitis and type D causes bacillary hemoglobinuria (Delano, Mischler, & Underwood, 2002).

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