Toxic Shock Syndrome

By Ashley Rios

Toxic Shock Syndrome is a rare, but serious acute disease that is caused by bacteria *Staphylococcus aureus*. Another bacterium that can cause this disease is group A *Streptococcus pyogenes* but is far less common.

**Reservoirs:**

Humans are the primary reservoirs for *S. aureus*. This bacteria is present up to 25% on the human body of normal flora of healthy people. This bacteria is normally present in moist areas such as the nose and the vagina. *S. aureus* is usually colonized in the skin, hair, nose and throat of humans and is also present in some animals.

**Transmission:**

Toxic shock syndrome can not be transmitted from infected person to uninfected person. *Staphylococcus* infections caused by pneumonia, sinusitis, osteomyelitis (infection of the bone) or skin wounds, such as burns or surgical sites. If these areas are infected, the bacteria can enter the bloodstream and cause TSS.

**Characteristics of *Staphylococcus aureus***:

*S. aureus* is a bacterium that is normally present in our normal flora, preferring moist areas, such as our nose and the vagina. This bacterium is non motile and is a facultative anaerobic, making it adaptable for any environment its in. When grown on a agar plate, the microorganism forms a string of golden colonies, making it very distinguishable. After performing a gram staining, the view under microscope is a gram positive, stained dark purple, forming grape like clusters.

**Key Tests used for identification:**

Test used for identification of *S. aureus* are the Coagulase test, catalase test in which both will give a positive result. Currently there is not “specific test” for TSS but there are many tests a provider may use to ensure that the bacteria they are testing for is *S. aureus*. The provider may utilize tests such as blood cultures, urine test, blood test, and lumbar puncture (a procedure that withdraw spinal fluid to check for the bacteria). They may also take swabs from the throat, and vagina.

**Symptoms and signs of Toxic Shock Syndrome:**
Symptoms of TSS in the beginning mimic the symptoms of infections but as it progresses the severity heightens. Below are some of the most common symptoms of TSS:

- Fever higher that 102F
- Chills
- Headache
- Fever
- Diarrhea
- Rash that is red and flat
- Shedding of skin in large amounts such as in the palms and feet (often seen about 1 to 2 weeks after the onset of symptoms)
- Low blood pressure
- Vomiting
- Decreased liver function
- Bruising due to low blood platelet count
- Muscle pain
- Increase blood flow to the mouth, eyes, and vagina (making them appear red) 5

**Historical Information of TSS:**

Toxic shock syndrome was first described in 1978 by Todd et al, who reported the symptoms from a group of children from the age of 8 to 17. In the next several years, awareness quickly escalated in the 1980’s when menstruating woman who were using “superabsorbent” tampons were getting sick and even dying. In May of 1980 the investigators reported 55 cases to the CDC, which 95% of them occurred in women. Toxic shock syndrome quickly became associated with menstruating women during the huge epidemic with 890 cases reported, 95% were associated with menstruation and with 38 women dying. But now in modern days TSS is separated into two categories: menstrual and nonmenstrual TSS after it was made very clear that it could occur in boys and girls of any age. With this increased awareness it became clear that TSS is definitely not only associated with menstruating women and anyone could acquire this disease. Up to 45% of TSS cases are non menstrual. They can
occur from animal bites, to breast augmentation surgery, post surgical wound infections, to nasal packing.

Virulence factors:

Below are the virulence factors for Staphylococcus aureus 1. Surface proteins encourage the colonization of the host’s tissues 2. Invasions help promote the bacterial spread in tissues 3. Capsule and protein A help inhibit the phagocytic engulfment 4. Carotenoids and catalase are biochemical properties that enhance the chance of survival of S. aureus from phagocytosis 5. Coagulase and protein A help disguise S. aureus from the host’s immune system. 6. Leukotoxins, hemolysins and leukocidin are membrane-damaging toxins produced that lyse eukaryotic cell membranes 7. Exotoxins are released and damage the host's tissues while aggravating the symptoms of TSS

Treatment and Control:

Specific treatment of S aureus of TSS will be based on your age, your overall health, medical history, extent of the disease and etc. The treatment for TSS may include but not limited to the following:

- Administration of IV antibiotics
- The use of intravenous fluid to treat shock and prevent organ failure
- In patients with very low blood pressure, cardiac medications will be given
- Patients the develop kidney failure dialysis may be needed
- If TSS stems from a surgical wound, deep surgical cleaning will be done
- Mechanical ventilation/supplemental oxygen might be needed for patients who need assistance with breathing

Prevention: Here are a few precautions that can be taken in order to help prevent TSS

- Since reinfection is a very common in TSS, menstruating women and girls should avoid using tampons if they've had TSS in the past
  - Minimal usage of vaginal foreign objects such as sponges, diaphragms, tampons aids in reducing the chance of TSS. If tampons must be used, they should be changed frequently (every 4-8 hrs).
Thorough care of surgical wound care is of utmost importance.  

Local Cases: Since the 1980’s cases or outbreaks of TSS have dramatically declined. In the early 1980s long-term morbidity was observed in up to 90% of TSS cases. It has remained stable through surveillance of 2000-2006 compared to “past population based incidence from the 1980’s”. However four recent cases in 2016 of West Michigan created big concern as all 4 teenage girls caught the disease, with a 15 year old having “one of the most severe cases doctors have seen”. Global Cases: Information on global outbreaks on TSS are very limited. But in 2017 Japan had a record breaking cases of TSS with a total number of 539. The most they have seen since they have been keeping track since 1999. The country’s recent increase of TSS remains a mystery.

References


