EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER
DEPARTMENT OF EMERGENCY MEDICINE

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Care Warriors

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Toxic Shock Syndrome

A 21-year-old female with no past medical history presents to the emergency department with fever, rash, nausea and vomiting for the last 48 hours. Her menstrual cycle ended yesterday and she admits to using 1-2 tampons daily. She lives alone and denies recent travel or sick contacts. She is up to date on all vaccinations. Her vital signs include a temperature of 103 °F, blood pressure of 90/58 mmHg and pulse of 112 beats per minute. On physical exam, she is slightly confused and has a diffuse erythematous rash on the palms and soles. She is immediately started on IV fluids. Which of the following organisms is most likely responsible for this patient's symptoms?

A. *Rickettsia rickettsii*

B. *Streptococcus pyogenes*

C. *Neisseria meningitidis*

D. *Leptospira interrogans*

E. *Staphylococcus aureus*

F. *Treponema pallidum*

Toxic shock syndrome is a rare life threatening illness caused by the release of exotoxins from certain bacteria.

Approximately 90% of the cases of TSS occur in females.

Symptoms usually begin within several days of the onset of a menstrual cycle in women using tampons.

Skin manifestations of TSS include a diffuse, erythematous macular rash that extends into the palms and soles of the feet as seen above.

EM Case of the Week is a weekly "pop quiz" for ED staff.

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

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The correct answer is E.

Most cases of toxic shock syndrome are attributed to *Staphylococcal aureus* species that produce the exotoxin, toxic shock syndrome toxin-1 (TSST-1). *S. aureus* colonizes 30-50% of healthy individuals, most commonly in the nares, skin, vagina, and rectum. *S. pyogenes* can also cause a toxic shock like syndrome but it is less common and often arises from a severe, painful soft tissue infection.

Discussion

Staphylococcus aureus produces several exotoxins, including TSST-1, which causes toxic shock syndrome. TSST-1 is a superantigen binding to MHC II and T-cell receptors, resulting in polyclonal T-cell activation. Subsequently, a massive release of cytokines occurs that can lead to multiorgan failure and death.

Half of the cases of TSS are related to the menstrual cycle and associated with tampon use, as tampons may become a nidus for infection. However, in recent years cases attributed to tampon use have declined due to advances in the manufacturing process.

Non-menstrual cases may be seen in surgical and post-partum wound infections, burns, septorhinoplasty, mastitis, osteomyelitis, sinusitis, as well as cutaneous and subcutaneous lesions.

Most cases occur in otherwise healthy individuals and symptoms ensue rapidly. Acute symptoms may include nausea, fever, vomiting, diarrhea, sunburn like rash, as well as chills, malaise, sore throat, headache, myalgias, abdominal pain, scleral hemorrhage, and syncope. Late manifestations of the skin include desquamation of the palms and soles which occurs 1-3 weeks after the illness as seen in the top right corner.

Management and Treatment

Supportive care in patients with TSS is imperative. Hypotension will require adequate fluid replacement to maintain perfusion. Vasopressors such as dopamine and norepinephrine may also be needed if blood pressure cannot be maintained with fluids alone.

Pelvic examinations should be done to assess the vaginal canal and remove any foreign materials that may be present. In postoperative TSS, all surgical wounds should be evaluated and if necessary, debridement and drainage performed. Cultures should also be collected to determine antibiotic susceptibility.

Most patients will be given antibiotic therapy for 1-2 weeks to eliminate the organism and prevent reoccurrence. Empiric therapy with clindamycin and vancomycin are recommended until susceptibilities are available. Clindamycin is preferred as it suppresses protein synthesis and therefore toxin production.

With TSS due to MSSA, clindamycin with oxacillin or nafcillin is preferred. Clindamycin plus vancomycin or linezolid alone may be used to treat TSS caused by MRSA. IV immune globulin is reserved for more severe cases.

It is also suggested that patients with TSS, who have positive nare cultures be treated with mupirocin.

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Clinical criteria for staphylococcal TSS issued by the United States Centers for Disease Control and Prevention:

- Fever: temperature greater than or equal to 102.0 °F
- Rash: diffuse macular erythroderma
- Desquamation: 1-2 weeks after onset of rash, particularly involving palms and soles
- Hypotension: systolic blood pressure less than or equal to 90 mmHg for adults or less than the fifth percentile by age for children < 16 years old
- Multisystem involvement (three or more of the following organ systems):
  1. Gastrointestinal: vomiting or diarrhea at onset of illness
  2. Muscular: severe myalgia or creatine phosphokinase level > 2 times the upper limit of normal
  3. Mucous membrane: vaginal, oropharyngeal, or conjunctival hyperemia
  4. Renal: BUN or creatinine > 2 times the upper limit of normal for laboratory or pyuria (> 5 leukocytes/high-power field) in the absence of urinary tract infection
  5. Hepatic: total bilirubin or transaminases > 2 times the upper limit of normal
  6. Hematologic: platelets < 100,000/microL
  7. Central nervous system: disorientation or alterations in consciousness without focal neurologic signs when fever and hypotension are absent

Laboratory criteria for diagnosis (if obtained):

- Negative results on blood or cerebrospinal fluid cultures (blood culture may be positive for Staphylococcus aureus)
- Negative serologies for Rocky Mountain spotted fever, leptospirosis, or measles

Case Classification:

- Probable: A case that meets lab criteria and in which 4/5 clinical criteria are present
- Confirmed: A case that meets lab criteria and all 5 clinical criteria are present including desquamation, unless the patient dies before desquamation occurs

Take Home Points

- Stabilize hypotension with fluids.
- Diagnosis is based on clinical criteria.
- Pelvic examinations should be performed on all female patients. Any foreign materials found in the vaginal canal need to be removed.
- Empiric treatment with antibiotics such as clindamycin is recommended at least until the patient stabilizes.

ABOUT THE AUTHOR

This month's case was written by Katherine Joseph. Katherine is a 4th year medical student from NSU-COM. She did her emergency medicine rotation at BHMC in March 2018. Katherine will be pursuing a career in OBGYN after graduation.

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