

Staphylococcal Toxic Shock Syndrome: The Critical Role of Early Recognition and Prompt Intervention

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Abstract

Presentation

We describe a 16-year-old girl presenting with four days of nausea, vomiting, malaise, and macular rash affecting the vulva and perineum during menstruation, following tampon use. She was febrile, hypotensive, tachycardic, and confused, with multi-organ dysfunction.

Diagnosis

Laboratory findings revealed leukocytosis, thrombocytopenia, renal impairment, markedly elevated CRP, and procalcitonin. Perineal swabs grew methicillin-sensitive *Staphylococcus aureus* resistant to clindamycin. Blood cultures were negative. The isolate was later confirmed to carry the *tst* gene encoding toxic shock syndrome toxin-1 (TSST-1).

Treatment

Broad-spectrum antibiotics were started, later rationalised to IV flucloxacillin after isolation of methicillin-susceptible *S. aureus*. The patient required critical care admission for monitoring and vasopressors but recovered quickly and was discharged well. Skin desquamation across neck, vulva, and perineum was noted during recovery.

Discussion

This case illustrates menstrual toxic shock syndrome due to TSST-1-producing *S. aureus*, occurring without evidence of prolonged tampon retention. Early recognition and management with microbiological testing are essential. Public education on safe tampon use remains vital to prevent this rare but life-threatening condition.

Introduction

Some strains of *Staphylococcus aureus* produce Toxic Shock Syndrome Toxin-1 (TSST-1), a superantigen responsible for staphylococcal toxic shock syndrome (TSS). This condition is potentially life-threatening, due to widespread immune activation leading to multi-system involvement¹. We report a case of staphylococcal TSS associated with tampon use, managed successfully with prompt clinical intervention and supportive care.

Case Report

A 16-year-old girl presented with four days of nausea, vomiting, and malaise, coinciding with menstruation. Her medical history included mild autism, with no drug allergies or recent travel. She reported tampon insertion approximately 18 hours prior to presentation. She reported greenish vaginal discharge, vulval rash, and pharyngitis.

On assessment, she was febrile (37.9°C initially, later reaching 39°C), hypotensive (blood pressure of 75/42), tachycardic with a heart rate of 140 beats per minute, mildly confused with Glasgow coma scale (GCS) score of 15/15, and had a witnessed syncope. There were no signs/symptoms of meningitis. A speculum exam revealed purulent discharge but no tampon; swabs were taken. Blood tests showed leukocytosis ($12.0 \times 10^9/\text{L}$), thrombocytopenia ($137 \times 10^9/\text{L}$), renal impairment, elevated CRP (328.2 mg/L), lactate (3.2 mmol/L), and creatine kinase (1909 IU/mL). Procalcitonin was markedly elevated (247.06 ng/mL). Chest radiography was clear and CT imaging of the abdomen and pelvis reported no significant abnormality detected, and no foreign body was demonstrated.

Empiric broad-spectrum antibiotics of flucloxacillin, benzylpenicillin, clindamycin, metronidazole, ciprofloxacin and gentamicin were initiated, with differential diagnoses of septic shock including toxic shock syndrome, pelvic inflammatory disease, syphilis, and viral infections such as measles or HIV seroconversion syndrome. She was transferred to intensive care unit (ICU) for vasopressor support due to persistent hypotension.

Perineal swabs grew methicillin-sensitive *S. aureus* (MSSA), which was shown to be resistant to clindamycin using VITEK II antimicrobial susceptibility testing (bioMérieux, Marcy l'Étoile, France). Single agent intravenous flucloxacillin was continued, and IV immunoglobulin (IVIg) was initiated. Linezolid was not administered due to clinical improvement. Blood cultures and tests for sexually transmitted infections (including Chlamydia, Gonorrhoea, HIV, Hepatitis B and C), measles, HSV, and ASOT were later returned negative. The rash cleared with desquamation noted on week 2.

She required vasopressor support for three days and was discharged from ICU on day 6 of admission. Antibiotic treatment was completed on day 9. She was discharged home with no

follow up required. Testing of the *S. aureus* isolate using whole genome sequencing at the national MRSA reference laboratory later confirmed presence of the *tst* gene encoding TSST-1.

Clinical criteria	Case met criteria
Fever $\geq 38.9^{\circ}\text{C}$	Yes
Rash (diffuse macular erythroderma)	Yes
Desquamation 1-2 weeks post onset of illness	Yes
Hypotension SBP ≤ 90	Yes
Multi system involvement (at least 3)	
Gastrointestinal (vomiting and diarrhoea)	Yes
Muscular (severe myalgia/elevated CPK twice the upper limit of normal)	No
Mucous membranes (hyperaemia of any mucosal surface)	No
Renal – blood urea nitrogen or creatinine twice upper limit of normal	Yes
Hepatic (total bilirubin twice-upper limit of normal)	No
Platelets $\leq 100/\text{L}$	No
CNS (disorientation, combativeness or alterations in consciousness without focal neurological signs)	Yes
Laboratory criteria:	
Negative results for	
Blood*, throat, CSF	Yes
*Blood may be positive for <i>S. aureus</i>	
Rise in titre to	
Rocky Mounted Spotted fever	Not tested
Leptospirosis	Not tested
Measles.	Yes
Case classification	
Probable TSS:	
Meets 4 out of 5 clinical criteria and laboratory criteria	Yes
Confirmed TSS:	
Meets all 5 clinical criteria and laboratory criteria	No
Additional testing performed	
<i>Chlamydia trachomatis</i>	rRNA ND
<i>Neisseria gonorrhoea</i>	rRNA ND
HIV/Hepatitis B/Hepatitis C/ <i>Treponema pallidum</i> serology	Negative
Anti-streptolysin O titre	<20 IU/ML
Herpes Simplex Virus 1 and 2 Serology	Negative

Table 1: Comparison of clinical case with diagnostic criteria of Staphylococcal TSS using Centre for Disease surveillance 2011 case definitions and additional testing performed.

Discussion

Staphylococcal TSS results from production of exotoxins that are superantigens, triggering widespread T cell activation and a cytokine storm leading to fever, rash, hypotension, and multi-organ failure. It is categorized as menstrual (mTSS) or non-menstrual (nmTSS). mTSS affects mostly young women and is typically associated with vaginal colonization by TSST-1-producing *S. aureus*. Blood cultures are often negative, and mortality is around 5%².

Past mTSS cases were linked to highly absorbent tampon brands, since withdrawn². Although now rare, mTSS persists, highlighted by a recent inquest into the death of an Irish mother linked to tampon use³. TSS is not notifiable in Ireland, and its true incidence is unknown. A UK study of voluntary notifications reported an incidence of 0.09 cases per 100,000⁴. Risk factors include prolonged tampon use, lack of education about tampon use, and inadequate levels of TSST-1-neutralizing antibodies^{5,6}. Rare cases have been reported associated with use of menstrual cups^{7,8} and no cases are reported from use of period pants. In Ireland, 50% of girls aged 12–19 reported occasional period poverty (defined as limited access to menstrual hygiene products due to financial constraints), which may lead to extended tampon use, with up to 85,000 women at risk⁹.

Centers for Disease Control and Prevention (CDC) criteria for TSS are specific but retrospective¹⁰, and so diagnosis is often clinical and presumptive. Our patient met all five clinical criteria (Table 1), but laboratory criteria for confirmed or probable TSS were not met as Rocky Mountain Spotted Fever and leptospirosis were not tested for (due to the low levels of both in Ireland and absence of risk factors). Laboratory-confirmed *tst* gene presence further supported the diagnosis. Treatment involves source control, organ support, and antibiotics that inhibit both cell wall synthesis (beta-lactams) and protein synthesis (clindamycin or linezolid) to reduce toxin production. IVIg may help neutralize toxins, though evidence is limited^{2,5}. Recovery with rapid stabilisation and short hospitalisation was as per previous studies¹⁰.

This case demonstrates the importance of early recognition and management of TSS and reinforces that TSS can occur even without a retained tampon. Public awareness, safe tampon use, and early clinical suspicion remain critical in reducing TSS-related morbidity and mortality.

Declarations of Conflicts of Interest:

None declared.

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