

## CLINICAL VIGNETTE

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# A Case of Urosepsis due to *Staphylococcus simulans* Infection in a Pediatric Patient

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### Abstract

*Staphylococcus simulans*, a coagulase negative staphylococcus, has been documented as a transient colonizer of human skin with pathogenic features. Previously associated with osteomyelitis, endocarditis, and skin infections in adults and immunocompromised patients, we describe the first report of *S simulans* urosepsis occurring in a healthy pediatric patient without predisposing risk factors.

### Introduction

*Staphylococcus simulans* is a coagulase-negative staphylococcal species (CoNS) that has been documented to be an uncommon transient colonizer of human skin.<sup>1</sup> Though commonly described as a pathogen resulting in mastitis in domesticated cattle, sheep, and other ruminant animals,<sup>2</sup> there have been several case reports of *S simulans* resulting in human pathogenic infections, including septicemia,<sup>3</sup> endocarditis,<sup>4</sup> osteomyelitis,<sup>3,5</sup> urinary tract infections,<sup>6</sup> and skin infections.<sup>7</sup> These reports have been described in the adult population (39+ years old), are usually associated with an underlying immunodeficiency or susceptibility, and typically have involved contact with bovine and ruminant animals. We describe what we believe to be the first case of *S simulans* urosepsis in the pediatric population.

### Case Report

A 4-year-old boy initially presented to the emergency department (ED) in October 2018 with complaints of 3 days of fever, generalized abdominal pain, and decreased oral intake of fluids. His past medical history included global developmental delay, chromosomal deletion of autosomes with uncertain clinical significance, and mild chronic bilateral pelviectasis with no known history of vesicoureteral reflux or previous urinary tract infections. On this initial presentation to the ED, he was febrile to 39.1°C and tachycardic to a heart rate of 149, with benign abdominal examination. He defervesced to 37.1°C with a single dose of acetaminophen, and he tolerated oral intake of fluids. Abdominal ultrasound was negative for appendicitis or intussusception. He was eventually discharged home with a diagnosis of presumed acute viral gastroenteritis.

The following day, he returned to the ED with continued fevers and decreased urine output. On his second presentation, temper-

ature was 39°C and he was tachycardic to a heart rate of 140. Physical exam was pertinent for right-sided costovertebral angle tenderness. The patient was evaluated with complete blood count, basic metabolic panel, C-reactive protein and urinalysis and culture. Labs resulted with a white blood cell count of 18.2 k/ $\mu$ L; C-reactive protein 37.5mg/dL; creatinine of 0.64mg/dL (previously known baseline of 0.37mg/dL 1 year prior); and urinalysis with protein 30 mg/dL, ketones 80 mg/dL, trace blood, positive nitrites, and 6 white blood cells per high powered field. Blood cultures were collected. The patient was started on empiric intravenous (IV) cefazolin 100mg/kg/day divided every 6 hours and admitted to the hospital for further management of presumed pyelonephritis and dehydration.

Both blood and urine cultures returned with significant growth of *Staphylococcus simulans*, making contamination unlikely. Sensitivities returned as oxacillin sensitive and antibiotic treatment was narrowed to oxacillin 200mg/kg/day divided every 6 hours. During the hospitalization, a renal ultrasound identified new mild-moderate left hydronephrosis over previously known bilateral mild pelviectasis. The urinary bladder was within normal limits, and there were no identified renal calculi or other masses. Subsequently drawn blood cultures were negative for bacteria and the patient recovered well, completing 10 days of inpatient IV antibiotics management prior to discharge.

### Discussion

CoNS staphylococci represent a common group of bacteria, present in the environment, that typically colonize human skin, but have been demonstrated to cause significant clinical disease. *S simulans* likely behaves like *Staphylococcus aureus*, where it has potential to colonize human skin and lead to infection. They share many of the same virulence factors, including a capsule and the ability to produce biofilms, both of which allow evasion of innate host immune responses. It is also possible for *S simulans* to acquire the *mecA* gene of *S aureus*, resulting in antibiotic resistance to methicillin.<sup>1</sup> *S simulans* may have significant pathogenic potential in any infection where it is allowed access to the cardiovascular system.

Though *S simulans* is more commonly noted to be a pathogen of bovine species resulting in mastitis, it has been previously

documented as a pathogen in several cases of transient bacteremia leading to endocarditis<sup>4</sup> and osteomyelitis.<sup>3,5</sup> These infections have been described in persons aged 39-80 years old, many of whom had comorbidities such as diabetes, recent prosthetic joint replacement, or other immunocompromised states. A majority of these patients also had exposure to ruminant mammals allowing for possible colonization of these persons, including work as a butcher<sup>5</sup> or dairy farmer.<sup>7</sup>

Our pediatric patient differs from previous reported cases of *S simulans* infection, as he had no exposure to bovine or other ruminant mammals and does not live on a farm, thus bringing into question his exposure to the pathogen. *S simulans* has been shown to reside in unpasteurized milk from afflicted herds,<sup>8</sup> though our patient has no known contact with domesticated animals or consumption of unpasteurized milk. *S simulans* has been previously associated with rural-living in 3 out of 5 patients documented in prosthetic joint infections.<sup>9</sup> Thus, it is possible that this isolated risk factor may explain our patient's only exposure as the risk may have been increased among patients in our hospital system which serves a largely rural and suburban population.

### Conclusion

We presented a 4-year-old boy who was diagnosed and treated for urosepsis secondary to *S simulans* infection. *S simulans* and other CoNS bacteria are less common, though still clinically significant, etiologies for endocarditis, osteomyelitis, sepsis, and other infections. Typically acquired after prolonged exposure, urbanicity of the patient population may influence risk of infection for different CoNS species. It is important to recognize CoNS pathogenic infections, as treatment may be difficult in the setting of growing antibiotic resistance, and these infections may predispose to endocarditis and other significant clinical sequelae.

### Acknowledgements

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