

**BRIEF REPORT**

# *Staphylococcus epidermidis* in Urine Is Not Always Benign: A Case Report of Pyelonephritis in a Child

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**Purpose:** *Staphylococcus epidermidis* in urine cultures from previously healthy children is usually considered to be a contaminant. The goal of this study was to identify cases in which *S. epidermidis* was an infectious cause of urinary tract infection (UTI) in children.

**Methods:** A literature search identified 7 cases, 6 of which were previously published and 1 which was unpublished, described herein.

**Results:** *S. epidermidis* was identified as the causative organism of UTIs in children with underlying urinary tract abnormalities.

**Conclusion:** UTIs caused by *S. epidermidis* in a previously healthy child should not be disregarded as a contaminant and further workup for urinary tract abnormality is indicated. (J Am Board Fam Med 2015;28:151–153.)

**Keywords:** *Staphylococcus epidermidis*, Urinary Tract Infections, Vesicoureteral Reflux

In healthy children, urinary tract infections (UTIs) are usually caused by Gram-negative organisms (mainly *Escherichia coli*) and certain Gram-positive organisms such as *Staphylococcus saprophyticus* and *Enterococcus*.<sup>1</sup> When *Staphylococcus epidermidis* is isolated in urine culture, it is assumed to be a contaminant.<sup>2</sup> As demonstrated in the following case, however, this assumption should not be made in a symptomatic child for whom an alternate source of infection cannot be identified. This case also highlights the importance of suspecting an underlying urinary tract abnormality when *S. epidermidis* is identified as the causative agent of UTIs in children.

## Case Report

A previously healthy 4-year-old circumcised boy presented with fever, abdominal pain and vomiting for 1 day. A clean catch urinalysis showed 4 to 6 white blood cells per high-powered field and moderate bacteria. His symptoms continued to worsen; his white blood cell count was 23,900/mm<sup>3</sup> (83.7% neutrophils, 9.2% lymphocytes, 6.5% monocytes) and his C-reactive protein concentration was 5.8 mg/dL. He was admitted for dehydration and systemic inflammatory response syndrome. Imaging was done to rule out appendicitis and pneumonia.

On hospital day 3, C-reactive protein spiked to 20 mg/dL and urine culture grew >100,000 colony-forming units (CFUs) of *S. epidermidis*/mL. Because of reluctance to ascribe the patient's illness to *S. epidermidis*, the urine culture was repeated and again grew 100,000 CFUs of *S. epidermidis*/mL. The patient was treated with intravenous levofloxacin 10 mg/kg twice a day and improved back to his baseline within 12 hours.

The new working diagnosis was sepsis secondary to pyelonephritis, at which point a renal ultrasound was ordered and showed normal kidneys bilaterally; the bladder was incompletely distended but grossly normal.

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**Table 1. Case Reports of Previously Healthy Boys Who Had a Urinary Tract Infection Caused by *Staphylococcus epidermidis* and the Urinary Tract Abnormality Found on Each Case**

Authors	Age (years)	Symptoms Reported	Urinalysis (cells/hpf)	Urine culture ( <i>Staphylococcus epidermidis</i> growth in CFUs/mL)	Second Urine Culture	Urinary Tract Abnormality
Hagler & Dobkin <sup>2</sup>	9	Dysuria, difficulty initiating urinary stream	RBCs 3–6, WBCs 100, large bacteria	>100,000 and <i>Enterococcus</i>	Same as first	Diverticulum of the bladder
	11	Fever, abdominal pain, vomiting, sore throat, diarrhea	WBCs 20–30, large bacteria	>100,000	Same as first	Diverticulum of the bladder
Hall & Snitzer <sup>3</sup>	6	Fever, abdominal and flank pain, vomiting	RBCs 2–4, proteinuria +1, ketonuria +1	>1,000,000	Same as first	Bilateral grade III reflux, bilateral duplicating collecting system
	7	Fever, abdominal pain, vomiting, chills	RBCs 0–1, WBCs 3–5, proteinuria +1, trace blood, ketonuria +2	>100,000	>50,000	Right grade III reflux, left grade II reflux
McDonald and Lohr <sup>4</sup>	11	Fever, abdominal pain, vomiting,	WBCs 5–8, trace leukocyte esterase	>100,000	Same as first	Right grade III reflux
Upadhyayula et al <sup>5</sup>	<1	Fever, upper respiratory symptoms	WBCs <5	1000–100,000	>100,000	Right grade V reflux, left grade IV reflux

RBC, red blood cell; WBC, white blood cell.

The patient completed a 3-day course of intravenous levofloxacin and was sent home with oral levofloxacin for 12 days. An outpatient vesicocystourethrogram was performed and revealed right grade II reflux and no reflux on the left. The patient was referred to urology for follow-up.

## Discussion

*S. epidermidis* is not generally regarded as the causative agent of UTI in children with no preexisting conditions. This organism has more commonly been associated with UTIs in patients with indwelling urinary catheters and other instrumentation in the urinary tract.<sup>3</sup> When grown in culture in a healthy patient, *S. epidermidis* has traditionally been considered a contaminant. This case and 6 others like it (summarized in Table 1) provide evidence that this assumption should be avoided in symptomatic patients.

A PubMed literature search was done using the following terms: *Staphylococcus epidermidis*, *urinary tract infection*, *healthy*, and *pyelonephritis* and filtered to ages 0 to 18. Four case reports of *S. epidermidis* UTI were identified and are detailed in Table 1. All cases identified occurred in previously healthy boys, most of whom were circumcised. Most pa-

tients presented with gastrointestinal complaints and were incorrectly diagnosed with viral gastroenteritis after exclusion of appendicitis. Although not all patients displayed frank pyuria on urinalysis, in all cases urine cultures grew >100,000 CFUs/mL. All patients were treated with antibiotics and fully recovered within a few days. Of greatest significance, all the children had underlying urinary tract abnormalities, detailed in Table 1, which were identified via renal ultrasound and vesicocystourethrogram.

## Conclusion

While *S. epidermidis* has classically been regarded as a urinary contaminant, caution should be taken before making this assumption. In a symptomatic patient with repeat positive urine cultures, the possibility of an *S. epidermidis* UTI should be considered as the cause of the patient's symptoms. In addition to treatment with proper antibiotics, further workup for underlying urinary tract abnormalities is essential.

## References

- Edlin RS, Shapiro DJ, Hersh AL, Copp HL. Antibiotic resistance patterns of outpatient pediatric urinary tract infections. *J Urol* 2013;190:222–7.

2. Hagler S, Dobkin D. Urinary tract infection in the male caused by *Staphylococcus epidermidis* associated with diverticulum of the bladder. *Clin Pediatr (Phila)* 1990;29:527–8.
3. Hall DE, Snitzer JA 3rd. *Staphylococcus epidermidis* as a cause of urinary tract infections in children. *J Pediatr* 1994;124:437–8.
4. McDonald JA, Lohr JA. *Staphylococcus epidermidis* pyelonephritis in a previously healthy child. *Pediatr Infect Dis J* 1994;13:1155–6.
5. Upadhyayula S, Kambalapalli M, Asmar BI. *Staphylococcus epidermidis* urinary tract infection in an infant. *Case Rep Infect Dis* 2012;2012: 983153.