

Case Report

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Urinary tract infection due to *Staphylococcus lugdunensis* in a 70-year-old woman with cystocele grade 3

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Introduction: *Staphylococcus lugdunensis* is a coagulase-negative staphylococci that is increasingly being reported as a human pathogen.

Case presentation: Here, we describe a clinical case of urinary tract infection (UTI) due to *S. lugdunensis* in a 70-year-old woman with cystocele grade 3 who was successfully treated with cotrimoxazole. Although *S. lugdunensis* has rarely been reported to cause urinary tract infections and especially in immunosuppressed patients, we describe a case of UTI caused in an adult without the presence of an indwelling catheter or immunosuppression.

Conclusion: *S. lugdunensis* can be a urinary tract pathogen in adults without the presence of indwelling catheters or other obvious medical problems. Urine cultures that show *S. lugdunensis* should not be attributed to skin contamination, especially when the clinical findings are compatible with cystitis or pyelonephritis.

Keywords: cotrimoxazole; *Staphylococcus lugdunensis*; urinary tract infection.

Introduction

A large number of *Staphylococcus* spp. distinct from *Staphylococcus aureus* comprise the group known as coagulase-negative staphylococci (CoNS), so named for their inability to clot plasma due to the lack of production of the secreted enzyme coagulase (Bannerman & Peacock, 2007). *Staphylococcus lugdunensis* is a member of the CoNS and was first described in 1988 (Fleurette *et al.*, 1989). *S. lugdunensis* is commonly found on the human skin and is a rare contaminant in cultures (Seenivasan & Yu, 2003). *S. lugdunensis*, named after Lyon, France, the city where the organism was initially isolated (Fleurette *et al.*, 1989), has emerged as an important human pathogen with notable clinical and microbiological characteristics that stand out among those of other CoNS (Frank *et al.*, 2008). Described previously as 'surreptitious' (Sotutu *et al.*, 2002) and a 'wolf in sheep's clothing', *S. lugdunensis* behaves more like *S. aureus* than other CoNS in many respects, including exhibiting an elevated degree of virulence. Unlike *S. aureus*, *S. lugdunensis* does not possess secreted coagulase. However, some isolates produce a membrane-bound form of the enzyme (clumping factor) that yields a positive result in slide coagulase and/or rapid latex agglutination tests, potentially leading to misidentification of the organism as *S. aureus* in the clinical laboratory. *S. lugdunensis* has a

propensity to cause native valve endocarditis with a fulminant and highly destructive clinical course that is quite remarkable for a coagulase-negative species, which are otherwise more frequently the aetiological agents of prosthetic valve endocarditis (Huebner & Goldmann, 1999). It has also been implicated in intravenous line, urinary tract, surgical wound, central nervous system and prosthetic joint infections, as well as in osteomyelitis, septic joints, peritonitis, skin and soft-tissue infection, and breast abscesses (Hellbacher *et al.*, 2006; Klotchko *et al.*, 2011). Equally surprising, compared with CoNS, most *S. lugdunensis* isolates remain susceptible to a large number of antimicrobial agents (Frank *et al.*, 2007). With little doubt, *S. lugdunensis* cannot be considered a 'typical' CoNS, and its successful position as an unusually virulent pathogen deserves attention (Frank *et al.*, 2008). It has rarely been reported to cause urinary tract infections, and then predominantly in adults as part of mixed flora (Haile *et al.*, 2002). Here, we report a successfully treated case of urinary tract infection (UTI) caused by *S. lugdunensis* in a 70-year-old woman with cystocele grade 3.

Case report

A 70-year-old woman attended her primary physician with urinary tract symptoms in February 2014. Previously, she had been diagnosed with a cystocele grade 3 and had suffered from repetitive UTIs with *Escherichia coli* ($> 100\,000$ c.f.u. ml⁻¹) in recent years. In this case, urinalysis

Abbreviations: CoNS, coagulase-negative staphylococci; UTI, urinary tract infection.

showed proteinuria (1+), intense pyuria (+++), traces of blood and absence of nitrites; microscopic analysis showed 5–10 erythrocytes per high-power field. A urine culture grew 100 000 c.f.u. *Staphylococcus lugdunensis* ml⁻¹ in a pure culture. The micro-organism was identified by the Vitek ID-GP (bioMérieux) identification system. Antimicrobial susceptibility testing revealed susceptibility to oxacillin, cotrimoxazole, fosfomycin and levofloxacin according to the European Committee on Antimicrobial Susceptibility Testing guidelines (EUCAST, 2014). She received treatment with cotrimoxazole, and a follow-up urine culture performed after 48 h of antibiotic therapy was negative. The woman's clinical status improved significantly and the UTI was resolved.

Discussion

S. lugdunensis is a CoNS that has considerable potential as an opportunistic pathogen of humans (Bannerman & Peacock, 2007; Frank *et al.*, 2008). Urinary isolates of *S. lugdunensis* have been reported previously, but the exact significance of *S. lugdunensis* in the urine remains unclear (Haile *et al.*, 2002). A single monomicrobial case of clear-cut UTI has been reported (Casanova-Roman *et al.*, 2004). The clinical course and virulence of infections due to *S. lugdunensis* are known to resemble that of infections due to *S. aureus* (Frank *et al.*, 2008). *S. lugdunensis* is commonly found on the human skin. It has been suggested that the perineal region may be the natural habitat of this bacterium (Vandenesch *et al.*, 1993a). van der Mee-Marquet *et al.* (2003) reported that 22 % of patients carried *S. lugdunensis* in the inguinal and pubic areas, and carriage at both inguinal folds was frequent (68 % of carriers). Haile *et al.* (2002) isolated 500 CoNS from 4652 consecutive urine specimens; 31 (6 %) of these were identified as *S. lugdunensis*, but none was identified with a pure growth. As this organism can be a constituent of the perineal flora, it may contaminate urine during the collection process. However, in our case, *S. lugdunensis* was isolated in a pure culture and the patient's clinical course was consistent with UTI, and thus the possibility of contamination was completely ruled out. Klotchko *et al.* (2011) stated that *S. lugdunensis* has emerged from the shadows of the CoNS as a formidable pathogen. Their 3-year, single-centre experience involved 70 isolates, most of which were clearly associated with significant infection. Included were five endocarditis cases, two of which proved fatal, and a diversity of other clinical presentations. They found 13 monomicrobial, clinically significant, UTIs due to *S. lugdunensis*; four followed urinary tract instrumentation. Thus, the accumulating data suggest that *S. lugdunensis* should be considered a uropathogen when isolated in patients with clinical evidence of UTI. Specific virulence factors for *S. lugdunensis* have not been fully elucidated. Only a few known virulence factors have been variably produced such as lipase, esterase, glycocalyx and fibrinogen affinity factor. The virulence of *S. lugdunensis* is thought

to be due in part to the production of a δ -like toxin with phenotypic properties similar to the *S. aureus* δ -haemolysin (Vandenesch *et al.*, 1991). Additionally, accessory gene regulator (*agr*)-related sequences have also been demonstrated in *S. lugdunensis*; *agr* is considered a major regulatory determinant for virulence in *S. aureus* (Vandenesch *et al.*, 1993b). *S. lugdunensis* isolates are β -lactamase positive in 24–40 % of cases (Haile *et al.*, 2002; Herchline *et al.*, 1990), and 2–12 % are resistant to erythromycin (Herchline *et al.*, 1990; van der Mee-Marquet *et al.*, 2003). In conclusion, *S. lugdunensis* can be a urinary tract pathogen in adults without the presence of indwelling catheters or other obvious medical problems. Cultures that show this organism should not be attributed to skin contamination, especially when the clinical findings are compatible with UTI or pyelonephritis.

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