Escherichia hermannii as the sole pathogen in urosepsis: case report

R. A. Haasdijk and J. van Ingen

Department of Medical Microbiology, Radboudumc, Nijmegen, The Netherlands

Original Submission: 8 February 2017; **Revised Submission:** 5 November 2017; **Accepted:** 16 November 2017
Article published online: 22 November 2017

Corresponding author: R.A. Haasdijk, Radboud University Medical Center, Medical Microbiology (777), PO Box 9101, 6500 HB Nijmegen, The Netherlands
E-mail: Remco.Haasdijk@radboudumc.nl

A 43-year-old man presented with sudden onset fever and chills. His medical history included insulin-dependent diabetes mellitus, kidney transplant, complicated pancreas transplantation that which had required transplantectomy and an aneurysm of the arteria iliaca communis that had required endovascular aneurysm repair.

Physical examination revealed signs of a slightly enlarged liver. Vital signs were a respiratory rate of 16 breaths per minute, saturation 100% (without O_2), heart rate 120 beats per minute and blood pressure 118/65 mmHg. Laboratory testing showed C-reactive protein levels of 46 mg/L, haemoglobin 6.3 mmol/L, white blood cell count 9.3 × 10^9/L with 75% neutrophils and blood platelets 236 × 10^9/L. Urinalysis revealed positive leukocyte esterase, with >50 white blood count and 10 to 25 red blood cells per high-power field. His serum creatinine level was 205 μmol/L, and Modification of Diet in Renal Disease glomerular filtration rate 31 mL/min/1.73 m^2. Chest radiograph revealed nothing remarkable. A bacterial infection of the urinary tract was considered, and antibiotic therapy was initiated with oral cotrimoxazole (two divided doses of 480 mg, based on glomerular filtration rate).

The next day, blood and urine cultures yielded *Escherichia hermannii* (Fig. 1), identified by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (BioTyper; Bruker Daltonics, Bremen, Germany). We sequenced an 850 bp long fragment of the 16S rDNA gene, which revealed a 99% (849/850 bp) match with the *E. hermannii* CIP 103176 type strain (GenBank accession no. NR_104940.1). This strain was susceptible to amoxicillin/clavulanic acid and resistant to amoxicillin and ciprofloxacin in the Phoenix system (BD Bioscience, Erembodegem, Belgium), applying European Committee on Antimicrobial Susceptibility Testing clinical breakpoints. Cotrimoxazole was switched to oral amoxicillin/clavulanic acid (3 divided doses of 625 mg) for a total treatment duration of 2 weeks. Defervescence occurred in 48 hours, and the patient made a full, uneventful recovery while receiving treatment. No relapse occurred.

Urinary tract infections can be restricted to the bladder (cystitis) or can spread to the kidney (pyelonephritis) and even to the bloodstream (urosepsis). *Escherichia coli* is involved in >80% of cases [1]. The association of *E. hermannii* with urinary tract infections has rarely been reported. Tong *et al.* [2] described a patient with pyelonephritis but without bacteraemia, where *E. hermannii* was the sole pathogen, indicating the uropathogenic potential of this species.

E. hermannii—a Gram-negative, rod-shaped bacterium—was first described in 1982 and is a member of the family *Enterobacteriaceae*. On the basis of phenotypic data and the DNA hybridization technique, *E. hermannii* forms a distinct species within the *Escherichia* genus; it produces yellow pigment and showed only 35% to 45% DNA relatedness to *E. coli* [3]. *E. hermannii* is mainly isolated from environmental sources and has been sporadically identified from wound, respiratory and stool specimens [3–5]. Much is still unclear about the pathogenicity of *E. hermannii* because in most cases it has been isolated with other coexisting bacteria that were more pathogenic. A possible mechanism for pathogenicity of *E. hermannii* is the feature of biofilm formation, which was suspected in one case of catheter-related sepsis in a haemodialysis patient [2,6–8]. Furthermore, *E. hermannii* is inherently resistant to penicillin, ampicillin and carbenicillin because of its β-lactamase production [9]. For antibiotic treatment, β-lactams and quinolones with *in vivo* susceptibility have been used [6].

In conclusion, the present case demonstrates that *E. hermannii* may cause urosepsis as a sole pathogen, which confirms the uropathogenic potential of *E. hermannii*.

© 2017 The Authors. Published by Elsevier Ltd
This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/)
https://doi.org/10.1016/j.nmni.2017.11.005

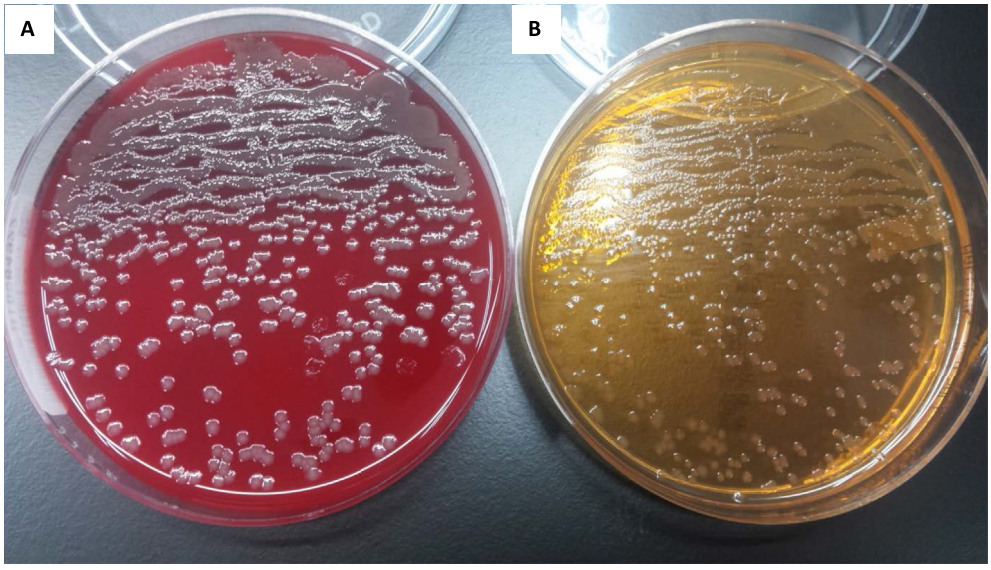

FIG. 1. Microbiological culture of *Escherichia hermannii.* (A) Columbia III agar with 5% sheep's blood (BD Bioscience). (B) MacConkey agar without salt (BD Bioscience). (C) Banklt2056671 Escherichia_hermanii_B16064920 MG256497.

Conflict of interest

None declared.

References

[1] Ipe DS, Ulett GC. Evaluation of the *in vitro* growth of urinary tract infection-causing Gram-negative and Gram-positive bacteria in a proposed synthetic human urine (SHU) medium. J Microbiol Methods 2016;127:164–71.

[2] Tong YQ, Xin B, Sun SQ. Pyelonephritis caused solely by *Escherichia hermannii*. Jundishapur J Microbiol 2014;7, e18138.

[3] Brenner DJ, Davis BR, Steigerwalt AG, Riddle CF, McWhorter AC, Allen SD, et al. Atypical biogroups of *Escherichia coli* found in clinical specimens and description of *Escherichia hermannii* sp. nov. J Clin Microbiol 1982;15:703–13.

[4] Dahl KM, Barry J, DeBiasi RL. *Escherichia hermannii* infection of a cephalohematoma: case report, review of the literature, and description of a novel invasive pathogen. Clin Infect Dis 2002;35:e96–8.

[5] Pien FD, Shrum S, Swenson JM, Hill BC, Thornsberry C, Farmer 3rd JJ. Colonization of human wounds by *Escherichia vulneris* and *Escherichia hermannii*. J Clin Microbiol 1985;22:283–5.

[6] Rank CU, Lommer Kristensen P, Schrøder Hansen D, Brandi L. Catheter related *Escherichia hermannii* sepsis in a haemodialysis patient. Open Microbiol J 2016;10:1–3.

[7] Kaewpoowat Q, Permpalung N, Sentochnik DE. Emerging *Escherichia* pathogen. J Clin Microbiol 2013;51:2785–6.

[8] Popescu GA, Daha I, Popescu C, Mitache E. *Staphylococcus aureus* and *Escherichia hermannii* in diabetes patient. Emerg Infect Dis 2004;10:1335–7.

[9] Stock I, Wiedemann B. Natural antibiotic susceptibility of *Escherichia coli, Shigella, E. vulneris*, and *E. hermannii* strains. Diagn Microbiol Infect Dis 1999;33:187–99.

© 2017 The Authors. Published by Elsevier Ltd, *NMNI*, **21**, 100–101
This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).