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Case Report

Microbiology Section

Blood Stream Infection by *Escherchia hermannii* in a Neonate

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ABSTRACT

Escherichia hermannii is a Gram negative bacillus, facultative anaerobe and member of the family *Enterobacteriaceae*. It was earlier classified as Enteric Group 11 by the Enteric Section of Centers for Disease Control (CDC) and was reported in the clinical laboratory as a yellow pigmented *E. coli* strain. On the basis of its unique genomic features, this organism was labelled as a distinct species in 1982. A successfully treated case of a blood stream infection by *E. hermannii* in a neonate is being described.

Keywords: Cephalosporins, *Enterobacteriaceae*, Sepsis

CASE REPORT

A two-day-old male baby presented with respiratory distress and noisy breathing starting on day 1 of life. The baby was 2nd in birth order, born to a 22-year-old mother at 36 weeks and 5 days by normal vaginal delivery with no antecedent history of prolonged rupture of membranes or fever. After 6 hours of birth the baby had noisy breathing for which baby was admitted in a local hospital and then subsequently transferred to a NICU where the baby deteriorated and required intubation and mechanical ventilation and was put on piperacillin/tazobactam. The baby was then shifted to our center.

On admission at our centre, on day three of birth, laboratory investigations were sent for microbiology cultures and routine haematology investigations. The blood sample was collected in BACTEC Peds plus vial and was sent to the Microbiology laboratory for automated culture into BACTEC 9050 system. Routine haematology investigations revealed leucocytosis, neutrophilia and bandemia (TLC 37,300 cells/cu mm, 90% neutrophils and 8% band forms). At our centre the baby was continued on ventilation for a day and then extubated the next day. Stridor was continued even in prone position and after nebulisation with adrenaline, ENT opinion was sought and videolaryngoscopy was offered but the attendants refused for the same.

In the laboratory, the blood sample from BACTEC vial (on beaping positive in BACTEC machine) was inoculated onto Sheep blood agar and MacConkey agar as per the lab protocol. Lactose fermenting Gram negative bacilli were obtained on MacConkey agar on overnight culture. The isolated microorganism was motile. It was identified as *Escherichia hermannii* by Microscan autoScan 4 (Siemens Healthcare Ltd.). This organism fermented glucose, arabinose, mannitol, and rhamnose and was positive for ornithine decarboxylase and indole production. It gave negative reactions for lactose, melibiose, and sorbitol fermentation, for arginine dihydrolase, H2S and urease production, and for lysine decarboxylase and citrate. Its Voges-Proskauer reaction was also negative. The organism was reported resistant to all beta lactams, beta lactam antibiotics, cephalosporins and carbapenems and sensitive to Colistin and Tigecycline.

The blood culture report was available on day 5 and accordingly the antibiotics were changed to Colistin and Amikacin. The baby improved significantly, his repeat blood culture after 7 days (Day 12) was sterile. The patient was discharged after 14 days of complete antibiotic treatment.

DISCUSSION

The genus *Escherichia* has been represented since long by a single species *Escherichia coli*. Following taxonomic reorganization of the genus, four new species apart from *E. coli* were introduced. These additional species include -*E. hermannii*, *E vulneris*, *E fergusonii*, and *E blattae* [1]. The speciation was based on biochemical tests, intra-species DNA homology, genome size, and guanine cytosine content. *E. hermannii* shares 35-45% DNA relatedness to *E. coli*. It can be differentiated from *E. coli* by the production of a yellow pigment and by various biochemical characteristics such as fermentation of cellobiose and positive reaction to potassium cyanate (KCN) [2].

Worldwide there have been sporadic reports implicating *E. hermannii* as a human pathogen. It has been isolated mostly from human wounds, sputum and faeces. This organism has been recovered from poly-microbial human infections where it was not the only organism but was isolated along with large numbers of other pathogenic bacteria [3,4]. It has been considered as an associated pathogen in a few invasive infections, which were mostly because of other co-existing more pathogenic bacteria [5,6]. Few case reports including infection of cephalohaematoma and CSF of a neonate [7], a case of purulent conjunctivitis [8] a case of catheter related sepsis [9] and a case of pyelonephritis [10] by *Escherichia hermannii* as the sole pathogen have been reported in recent literature. *E. hermannii* has been found to be associated with diarrhoea in humans and its entero-pathogenicity has been shown using the rat ileal loop model [1]. In 2009, a case of septicemia by *Escherichia hermannii* in an adult male with retroperitoneal sarcoma has been reported from India. The pathogen was also isolated from stool and sacral wound of the same patient [11].

E. hermanii was the sole pathogen grown from blood culture of our patient and the clinical condition of the patient improved following antibiotic administration as per the culture sensitivity report. This strengthens the evidence for the pathogenic potential of the bacterium. The acquisition of bacterium in our case can be attributed to the immunological naivety of the neonate which translated into an enhanced susceptibility to infection.

In vitro susceptibility studies have been conducted in the past on clinical and laboratory isolates of *E. hermannii* [12,13]. These studies demonstrated that the organism exhibits a distinctive antibiotic resistance pattern with resistance to penicillin, ampicillin, and carbenicillin. No cephalosporin resistance has been detected

in limited studies. However, our isolate was resistant to all beta lactams, cephalosporins and even carbapenems. It was sensitive only to Colistin and Tigecycline. Further clinical data are required to give antibiotic recommendations for treatment of infections by *E. hermannii*.

CONCLUSION

This case reinforces that *E. hermannii* can no more be neglected as an innocuous bystander in human infections. This case further adds to the evidence for the pathogenic potential of *E. hermannii*.

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