

# Multi-drug resistant *Ewingella americana*

Syed Z. Bukhari, MPhil, PhD, Waleed M. Hussain, MD, KFUF, Mohammad I. Fatani, MD, KFUF, Ahmad M. Ashshi, MSc, PhD.

## ABSTRACT

نستعرض هنا تقريراً لحالة ذات الرئة، ناتجة من ميكروب ايايفنجيلا امريكانا متعدد المناعة للمضادات الحيوية لمريض اندونيسي الجنسية يبلغ من العمر 30 عاماً. تم تنويم المريض في قسم العناية المركزة بمستشفى حراء العام - مكة المكرمة - المملكة العربية السعودية، إثر تعرضه لحادث مروري أدى إلى إصابة شديدة بالرأس أثناء رحلة الحج لعام 2007م. تم إجراء الفحوصات اللازمة وتبين وجود ميكروب ايايفنجيلا امريكانا، وكان هذا الميكروب هو المسبب لمرض ذات الرئة مع أعراض سريرية، وإيجابية الفحوصات الإشعاعية. على حد علمنا يعتبر هذا أول تقرير من نوعه لميكروب ايايفنجيلا امريكانا المسبب لمرض ذات الرئة في المملكة العربية السعودية واندونيسيا.

We report a case of pneumonia due to multi-drug resistant *Ewingella americana* in a young patient admitted in the Intensive Care Unit of Hera General Hospital, Makkah, Saudi Arabia with severe head injury in a road traffic accident. He was an Indonesian pilgrim who had traveled to the Kingdom of Saudi Arabia to perform Hajj in December 2007. *Ewingella americana* was identified to be the pathogen of pneumonia with clinical signs and symptoms along with positive radiological findings.

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From the Departments of Microbiology (Bukhari, Ashshi), Internal Medicine (Hussain), and Dermatology (Fatani), Hera General Hospital, Makkah, Kingdom of Saudi Arabia.

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Address correspondence and reprint request to: Dr. Syed Z. Bukhari, Consultant Microbiologist, Department of Microbiology, Hera General Hospital, PO Box 20865, Makkah, Kingdom of Saudi Arabia. Tel. +966 (2) 5203535 Ext. 4302/4313. Fax. +966 (2) 5200333. Mobile. +966 501531042. E-mail: zahidbukhari100@msn.com

Although the pathogenic significance and the reservoir of *Ewingella americana* (*E. americana*) have not been clarified, this organism has caused several pathogenic infections, especially in immunocompromised patients.<sup>1</sup> *Ewingella americana*, an unusual *Enterobacteriaceae*, was first described in 1983 and was previously known

as Center for Disease Control and Prevention Enteric Group 40.<sup>2</sup> This genus includes only one species, *E. americana*. This microorganism is rarely found in human clinical samples, but its human potential pathogenicity has been documented.<sup>3-6</sup> This organism is a rare bacterial cause of pneumonia, and reporting its occurrence in Kingdom of Saudi Arabia is the objective of this case presentation.

**Case Report.** A 30-year-old young male Indonesian Makkah pilgrim was admitted to the Hera General Hospital, Makkah, Kingdom of Saudi Arabia with multiple injuries in a road traffic accident during the Hajj period in December 2007. He was deeply comatose at the time of admission. His brain CT scan showed brain edema, intracerebral hemorrhage in basal ganglia to the right thalamus, subarachnoid hemorrhage, along with the fracture of frontal bone. There was decreased air entry with bilateral basal crepitations. Abdomen was lax and soft. He was intubated, resuscitated, and put on a mechanical ventilator in the Intensive Care Unit (ICU). Further investigations revealed contusion on the right upper lung. Upon admission, laboratory findings were as follows: hematocrit, 22% (normal range [NR]: 42-52%), leukocyte count,  $6.88 \times 10^3/\text{mm}^3$  (NR:  $5-10 \times 10^3/\text{mm}^3$ ); creatinine level in blood, 7.9 mg/dl (NR: 0.6-1.3 mg/dl); urea level in blood, 478 mg/dl (NR: 15-39 mg/dl), and random blood glucose level 205 mg/dl (NR: 70-200 mg/dl). His general condition deteriorated from the beginning, and upon the eighth day of admission he went to the stage of multiple organ failure and died. On his routine microbiological investigations, we found an interesting and rare organism *E. americana* from his tracheal aspirate. The sample was inoculated onto 5% sheep blood agar aerobically and anaerobically and MacConkey agar at 35°C for 24 hours. Figure 1 demonstrates large (2-3 mm diameter) grey, mucoid colonies of *E. americana* on aerobic blood agar plate. Short Gram negative bacilli were seen on Gram's staining as shown in Figure 2. The strain isolated was lactose-fermenting, oxidase negative, and catalase positive. The other biochemical properties were; positive citrate utilization, mannitol fermentation, and

**Table 1** - Minimum inhibitory concentration (MIC) values and interpretation of *Ewingella americana*.

Antibiotic	MIC value mcg/ml (mg/L)	Interpretation
Amikacin	>32	R
Amoxicillin/K Clavulanate	2	I
Ampicillin/Sulbactam	>16	R
Ampicillin	>16	R
Cefazolin	>16	R
Cefepime	>16	R
Cefotaxime	>32	R
Ceftazidime	>16	R
Ceftriaxone	>32	R
Cefuroxime	>16	R
Cephalothin	>16	R
Gentamicin	>8	R
Imipenem	>8	R
Piperacillin/Tazobactam	>64	R
Piperacillin	>64	R
Tetracycline	>8	R
Ticarcillin/K Clavulanate	>64	R
Tobramycin	>8	R
Trimeth/Sulfamethoxazole	>2	R

R - resistant I - intermediate



**Figure 1** - Culture of *Ewingella americana* on blood agar plate, showing grey mucoid colonies.



**Figure 2** - Gram negative small rods of *Ewingella americana* (Gram stain x1000)

glucose acid production. There was no hydrogen sulfide gas production. The identification of *E. americana* and its antimicrobial susceptibility by minimum inhibitory concentration (MIC) was carried out on MicroScan Walk Away 96 S1 USA.<sup>7</sup> The strain was naturally resistant to all classes of antibiotics and intermediate susceptibility to Amoxicillin/K Clavulanate. The MIC values and interpretation of *E. americana* are given in **Table 1**. Deoxyribonucleic acid sequence analysis was not carried out as the facility was not available, and the mechanism of resistance could not be explained. Other microbiological samples of the patient like blood, urine, and stool were found negative for *E. americana*. The identified organism was the pathogen of pneumonia with clinical symptoms, signs and radiological examination. There was no history and no evidence of underlying chronic ailment. The environmental samples including the water used in patient care were also found negative for *E. americana* on culture. The patient might have been colonized from the country of origin. There was no surgical intervention of the patient.

**Discussion.** *Ewingella americana* is an infrequent opportunistic pathogen and its clinical significance remains unclear as reported by Farmer et al.<sup>8</sup> *Ewingella americana* is a rare gram-negative bacillus. Sporadic cases of *E. americana* are so far reported from wounds in compound fracture in South Africa,<sup>9</sup> conjunctiva in Brazil,<sup>10</sup> blood in Belgium,<sup>3</sup> peritoneum in Greece,<sup>11</sup> skin in Germany,<sup>12</sup> and chronic renal failure in Korea.<sup>1</sup> It was also reported as one of the healthcare associated infections in the ICU by Pien and Bruce.<sup>5</sup> In several of these cases, as well as in our patient, this organism appeared to occur more frequently in immunocompromised patients. Although generally susceptible to most antibiotics, our patient's organism was resistant to all antibiotics tested, with the exception Amoxicillin/K Clavulanate similar to Pound et al.<sup>13</sup>

The present work reports *E. americana* in the Kingdom of Saudi Arabia and Indonesia with undefined source of infection. Various epidemiologic investigations revealed that the probable source for the *E. americana* outbreak was within the environment of the patient.<sup>5,14</sup> Therefore, the most probable reason of harboring this organism by our patient was from an environmental source either from country of origin or in the Kingdom of Saudi Arabia. It can be proved by the peculiar characteristic of *E. americana* as it can survive for a longer period of time in water without any nutritional element.<sup>14</sup> In contrast, a few outbreaks due to *E. americana* have been reported by Pien and Bruce.<sup>5</sup> Its association with occupations such as farmers dealing with cultivation of mushroom and agaricus bisporus has already been reported by Inglis and Peberdy.<sup>15</sup> Unfortunately our patient was admitted

in an unconscious state with unknown identification, therefore its association with cultivation could not be proved. Major clinical pathology was the pneumonia. The cause of death may be pneumonia associated with brain damage.

In conclusion, *E. americana* is a rare cause of human infection, but its pathogenic significance was proved by clinical and radiological findings in our immunocompromised patient. The environment of the patient may be the major predisposing factor either in the Kingdom of Saudi Arabia or the country of origin. Further epidemiological studies are needed to define its ecology and possible role in human disease especially in the Kingdom of Saudi Arabia and Indonesia where no such case was reported before.

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