



Case report

Extended spectrum beta lactamase producing *Escherichia coli* tricuspid valve endocarditis



Rami Waked*, Gebrael Saliba, Nabil Chehata, Elie Haddad, Marie Chedid, Jacques Choucair

Department of Infectious Diseases, Faculty of Medicine, Saint Joseph University, Beirut, Lebanon

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ABSTRACT

Escherichia coli is a rare cause of endocarditis. This article reports an 82-year-old male with a mechanical aortic valve replacement who was admitted for fever and fatigue. He was diagnosed with a tricuspid valve endocarditis caused by an extended spectrum beta lactamase producing *Escherichia coli* following positive blood cultures and echocardiography. He received six weeks of imipenem / cilastatin and subsequently improved and was discharged with ambulatory follow ups with his infectious disease specialist.

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Introduction

Infective endocarditis is a rare disease accounting for 3–10 new cases per 100,000 people per year [1,2]. The epidemiology of this disease is changing, affecting higher average aged patients [3]. The most frequently isolated causes of infective endocarditis are the *Staphylococcus*, *Streptococcus* and *Enterococcus* species [4]. *Escherichia coli* is a very rare cause of infective endocarditis accounting for 0.51 % of cases in one series [5]. Its inability to adhere to the cardiac valve and the existence of antibodies to *Escherichia coli* in serum may result in this lower incidence [6]. The presented case highlights the importance of having a high index of suspicion for endocarditis even with an early negative echocardiography and an infective bacteremia rarely causing this disease.

Case

An 82-year-old man with a past medical history significant for hypertension, mechanical aortic valve replacement in the year 2000, an arthrodesis with lumbar laminectomy in June 2015 and a high-grade bladder carcinoma resected by cystoscopy in January 2016, was admitted on 17 April 2016 for fever (39 °C), drowsiness

and dyspnea without any hemodynamic instability. His last antimicrobial use was during his cystoscopy when he received prophylactic cefuroxime perioperatively.

His physical examination was within normal limits except for a systolic ejection murmur mostly heard in the left second thoracic interspace and diffuse inspiratory rhonchi with coarse crackles at the right pulmonary base. Blood culture sets, sputum culture and urine culture were drawn. The chest x-ray on admission did not show any abnormality. A transthoracic cardiac ultrasound done on day one after admission showed a 70 % ejection fraction of the left ventricle with no signs of vegetation on any valve, and a proper functioning of the mechanical aortic valve (no regurgitation nor stenosis), mild mitral regurgitation and moderate tricuspid valve regurgitation. He was started empirically on ceftriaxone 2 g per day, but his clinical condition kept worsening with marked drowsiness and increase in blood C-reactive protein level (CRP) from 214 to 302 mg/L on day three.

A change in the antibiotic therapy was made, switching ceftriaxone to imipenem / cilastatin 500 mg every 8 h and moxifloxacin 400 mg every 24 h. The clinical condition of the patient improved significantly with sustained apyrexia on day 5. On the ninth day of admission, the patient deteriorated again clinically with fever at 38.4 °C and drowsiness. His blood tests revealed an acute kidney injury (blood creatinine at 1.7 mg/dL (patient's baseline level 1.2 mg/dL) and a CRP of 245 mg/L. Urine culture showed an extended spectrum beta-lactamase (ESBL) producing *Escherichia coli* that was resistant to ceftriaxone, fluoroquinolones and trimethoprim/sulfamethoxazole, but the

* Corresponding author at: Faculty of medicine Saint Joseph University, Medical sciences campus, Damascus street, PO BOX 11-5076, Riad El Solh, Beirut 1107 2180, Lebanon.

E-mail address: ramiwaked12@hotmail.com (R. Waked).

patient was asymptomatic. Blood cultures did not show any bacterial growth. A thoraco-abdomino-pelvic scan done on day nine showed a bilateral pleural effusion and a subcecal fat stranding. Fluconazole 200 mg IV was added. A transesophageal cardiac ultrasound on day 10 did not show any signs of valvular vegetation. Antibiotics and fluconazole were stopped on May 8, 2016 after a clear clinical improvement. The patient was considered to have a pulmonary infection and received a total of 21 days of antibiotic. The patient left the hospital on May 13, 2016.

He was readmitted three days later for clinical arthritis of the right knee. Magnetic resonance imaging showed an intra-articular effusion with geodes. A knee aspiration revealed a viscous, pale yellow, and clear liquid with 7000 white blood cells per mm³ and a sterile culture. He received only analgesics and was discharged after 48 h of his admission.

He was hospitalized on the 25th of May 2016 for fever and deterioration of his general condition. He was hemodynamically stable with blood pressure of 110/70 mmHg, heart rate of 82 beats per minute and fever of 39 °C. He had normal heart sounds with a crescendo-decrescendo systolic murmur heard along the right upper sternal border, which was not heard on previous admissions. Pulmonary, abdominal and neurological examinations were unremarkable. His laboratory tests revealed a leukocytosis (16,200/μL), neutrophilia (90.8 %), CRP of 85 mg/L and an elevated creatinine level (1.8 mg/dL). The chest X-ray was normal, the urine was negative, but three sets of peripheral blood culture grew an ESBL producing *Escherichia coli* that was resistant to all penicillins, cephalosporins, quinolones and trimethoprim-sulfamethoxazole. A transthoracic cardiac ultrasound done on day two of his admission showed a 0.9 cm × 0.7 cm tricuspid vegetation on the posterior leaflet (auricular side) with a moderate tricuspid valve regurgitation. He was therefore started again on imipenem and cilastatin 500 mg intravenously every 8 h. A close re-examination of the patient did not show peripheral stigmata of endocarditis. The patient was not an intravenous drug user, and he did not have a recent dental procedure. A transesophageal echocardiography repeated at day seven after admission confirmed the presence of a mobile 0.9 cm × 0.7 cm tricuspid valve vegetation on the posterior leaflet with moderate valvular regurgitation. Sterilization of blood cultures occurred on day 7 and was confirmed again on days 14 and 21. A transesophageal cardiac echocardiography performed on the 30th day of antibiotic therapy showed near resolution of the tricuspid vegetation and normal ejection fraction. The patient improved clinically and remained hemodynamically stable throughout his hospitalization. A surgical procedure was not performed because of the clinical improvement and the high surgical risk.

After receiving six weeks of intravenous imipenem/cilastatin antibiotic therapy, the patient was discharged home. He received ambulatory follow ups with his infectious disease specialist: a series of transthoracic echocardiographs and blood tests confirmed his cure.

Discussion

Fever >38 °C, three positive blood culture sets, the presence of vegetations on tricuspid valve on cardiac ultrasound with probable secondary location (knee arthritis), represent two major and two minor criteria to support the diagnosis of endocarditis in this patient made according to the modified Duke's infective endocarditis criteria [7]. *Escherichia coli* is one of the most common causes of bacteremia but remains a very rare cause of native endocarditis. Thirty-three cases have been reported until the year 2018 [8]. Tricuspid endocarditis due to *Escherichia coli* was reported in four patients [9–12]. Endocarditis caused by an ESBL producing *Escherichia coli* was recorded in six cases in the

literature [9,13–17]. Tricuspid endocarditis due to an ESBL producing *Escherichia coli* was reported in only one case other than the present case [9].

The treatment of these ESBL producing *Escherichia coli* endocarditis differed between cases: two patients received only a monotherapy with carbapenem [13,15], and four cases were treated with a combination of a carbapenem with either an aminoglycoside [9,14,17] or quinolone [16]. The majority of these cases were treated medically without a surgical intervention [8]. The most probable cause of endocarditis reported in this case is urinary which is comparable to a series of *Escherichia coli* endocarditis reported by Micol R et al [18], where four out of five patients had a urinary tract infection. The management of these cases remains very difficult given the absence of recommendations in the literature.

ESBL-secreting *Escherichia coli* endocarditis remains very rare. With increasing rates of bacterial resistance worldwide, an increasing number of such cases are to be expected.

Consent

Written informed consent was obtained from the next of kin of the patient for publication of this case report. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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CRediT authorship contribution statement

Rami Waked: Writing - original draft. **Gabrael Saliba:** Writing - review & editing. **Nabil Chehata:** Writing - review & editing. **Elie Haddad:** Validation. **Marie Chedid:** Data curation. **Jacques Choucair:** Writing - review & editing.

Declaration of Competing Interest

None.

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