



Case report

Escherichia coli endocarditis of a native mitral valve

Ana Rita Nogueira*, Sofia Brazão, Diana Ferreira, António Aragão,
Manuel Teixeira Veríssimo, Armando Carvalho

Centro Hospitalar e Universitário de Coimbra, Portugal



ARTICLE INFO

Article history:

Received 14 April 2019

Received in revised form 29 April 2019

Accepted 29 April 2019

Keywords:

Endocarditis

Escherichia coli

Native valve

Gram-negative bacteria

ABSTRACT

Escherichia coli (*E.coli*) is a rare cause of endocarditis, although is a common causative agent of bacteremia. An 89-year-old woman presented with recurrent episodes of fever and persistent *E. coli* bacteremia with 3-month duration, despite antimicrobial therapy. At first, a urinary tract infection was diagnosed and later a mycotic aneurysm of the abdominal aorta was found and required an endovascular repair. The persistence of fever and the evidence of a systolic murmur at the mitral focus raised the suspicion of endocarditis. A transesophageal echocardiogram and a cardiac Magnetic Resonance Imaging (MRI) confirmed the presence of a vegetation at the mitral valve and the patient was treated with ceftriaxone. The presence of comorbid conditions and certain bacterial virulence factors predispose to this rare condition. A high level of suspicion is important to early diagnosis and prompt therapy.

© 2019 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/>).

Introduction

Gram-negative bacilli, especially *Enterobacteriaceae*, are a rare cause of endocarditis [1,2] affecting particularly the elderly population [3,4]. This happens despite Gram-negative microorganisms are the most common agent of bacteremia in the elderly from the community. *E. coli* is estimated to be responsible for 44% of all Gram-negative bacteremia episodes, with an increasing incidence with age [5].

Case presentation

An 89-year-old woman was admitted to our hospital with a history of recurrent episodes of fever for the previous 3 months. In the beginning, she was prescribed cefuroxime by her family doctor for cystitis. Two weeks later she presented with high fever (39 °C) and recurrent positive blood cultures for *E. coli*. A diagnosis of mycotic aneurysm of the abdominal aorta was made at another hospital and an endovascular repair was performed alongside with antimicrobial therapy.

At the time we consulted the patient, 6 weeks after the endovascular procedure, she complained about high fever and vomiting. Her past medical history included metabolic syndrome and mild psoriasis, treated in the past with topical steroids. In

addition, she was medicated with clopidogrel, candesartan and simvastatin. The physical exam confirmed the

fever and revealed a systolic murmur at the mitral focus not present at the time of her last hospitalization. No other relevant findings were found in the thoracic, abdominal or skin evaluation.

The laboratory tests exhibited leukocytosis ($15.2 \times 10^9/L$) and elevation of the C-reactive protein (10.3 mg/dL) and the erythrocyte sedimentation rate (53 mm/h). A urinary culture and four sets of blood cultures were collected at two different times with the growth of *E. coli*. An abdominal angio-CT was performed without relevant findings. A transesophageal echocardiogram was performed revealing a vegetation with 22×17 mm, at the mitral valve, confirmed by a cardiac MRI.

Therapy with ceftriaxone was initiated and maintained for 6 weeks. This case was discussed within a multidisciplinary team and surgical therapy was rejected because of the high surgical risk. During the hospital stay, she had an episode of cardiogenic pulmonary edema that was treated with diuretics and nitrates. The patient was discharged to a long-term care unit after several weeks of apyrexia and clinical improvement. A week after the patient died due to an episode of hematemesis, without an obvious link to the endocarditis.

Discussion

Few cases of endocarditis caused by *E. coli* have been described in the literature but it is estimated to represent 0.51% of infective endocarditis [1–4,6–8]. However, its incidence increased in the last years due to the changes in the demographic and clinical

* Corresponding author.

E-mail address: ritagnogueira@gmail.com (A.R. Nogueira).

characteristics of the population. Indeed, the studies show a greater incidence among diabetic elderly women with previous heart disease [3]. *E. coli* is usually unable to adhere to cardiac valve leaflets. However certain strains with phylogenetically unique characteristics have multiple virulence factors that enable them to cause extra-intestinal infections. These strains were designated as ExPEC (an acronym for Extra-intestinal Pathogenic *E. coli*) by some authors [9]. Risk factors include health care contact as long as implanted endovascular devices [10]. In another study, nondental invasive procedures and infections involving the genitourinary or gastrointestinal tract were identified as risk factors [7].

The mitral valve is most frequently affected [3] and patients with non-HACEK gram-negative bacillus endocarditis frequently presented symptoms for more than 1 month before the diagnosis [9]. Echocardiography is an important diagnostic tool [10,11] and plays a significant role in determining the evolution and the prognosis [12]. Endocarditis due to *E. coli* is associated with higher rates of in-hospital mortality and complications, such as large vegetations, perforation, abscess and arterial embolization, comparing to other causes of endocarditis [7,9]. Cardiac valve surgery is traditionally recommended. However, in a hospital-based prospective cohort of patients with non-HACEK gram-negative bacillus endocarditis, the mortality rate did not statistically differ between the patients who received medical therapy and those who received medico-surgical therapy, or between those who received single antimicrobial therapy and those with combination therapy [9].

Our patient presented various risk factors that include age, gender, a past urinary tract infection and a recent hospitalization in which an endovascular procedure was performed. The diagnosis was reasoned considering the clinical presentation, the persistence of *E. coli* bacteremia

and imaging results. The decision on a surgical therapy was carefully reasoned and was rejected due to the high surgical risk.

Conclusion

The incidence of endocarditis due to *E. coli* is increasing in the elderly population and may be associated with significant rates of morbidity and mortality. A high level of suspicion is important to ensure early diagnosis and therapy. It is of the utmost importance to discuss these cases within a multidisciplinary team to evaluate the most suitable therapy and assess the patient prognosis.

Conflict of interest

The authors have no potential conflicts of interest to disclose.

Funding

There are no sources of funding to declare.

Consent

Informed consent was obtained from the patient.

Author contribution

AR Nogueira – collected the data and drafted the manuscript.
S Brazão – collected the data and drafted the manuscript.

D Ferreira – drafted the manuscript.
A Aragão – Revised the manuscript critically for important intellectual content.

MT Veríssimo - Revised the manuscript critically for important intellectual content.

A Carvalho - Revised the manuscript critically for important intellectual content.

All authors approved the final version of the manuscript.

References

- [1] Falcone M, Tiseo G, Durante-Mangoni E, Ravasio V, Barbaro F, Ursi MP, et al. Risk factors and outcomes of endocarditis due to Non-HACEK gram-negative Bacilli: data from the prospective multicenter italian endocarditis study cohort. *Antimicrob Agents Chemother* 2018;62:1–11, doi:http://dx.doi.org/10.1128/AAC.02208-17.
- [2] Burgos LM, Osés P, Iribarren AC, Pennini AC, Pennini M, Merkt M, et al. Endocarditis infecciosa por bacilos gram negativos no HACEK. Experiencia en un centro de alta complejidad de la República Argentina (1998–2016). *Rev Argent Microbiol* 2018, doi:http://dx.doi.org/10.1016/j.ram.2018.03.006.
- [3] Micol R, Lortholary O, Jauregui F, Bonacorsi S, Bingen E, Lefort A, et al. *Escherichia coli* native valve endocarditis. *Clin Microbiol Infect* 2006;12:401–3, doi:http://dx.doi.org/10.1111/j.1469-0691.2006.01375.x.
- [4] Raza SS, Sultan OW, Sohail MR. Gram-negative bacterial endocarditis in adults: state-of-the-heart. *Expert Rev Anti Infect Ther* 2010;8:879–85, doi:http://dx.doi.org/10.1586/eri.10.76.
- [5] Hernandez C, Fehér C, Soriano A, Marco F, Almela M, Cobos-Trigueros N, et al. Clinical characteristics and outcome of elderly patients with community-onset bacteremia. *J Infect* 2015;70:135–43, doi:http://dx.doi.org/10.1016/j.jinf.2014.09.002.
- [6] Loubet P, Lescure FX, Lepage L, Kirsch M, Armand-Lefevre L, Bouadma L, et al. Endocarditis due to gram-negative bacilli at a French teaching hospital over a 6-year period: clinical characteristics and outcome. *Infect Dis* 2015;47:889–95, doi:http://dx.doi.org/10.3109/23744235.2015.1075660.
- [7] Branger S, Casalta JP, Habib G, Collard F, Raoult D. *Escherichia coli* endocarditis: seven new cases in adults and review of the literature. *Eur J Clin Microbiol Infect Dis* 2005;24:537–41, doi:http://dx.doi.org/10.1007/s10096-005-1379-6.
- [8] Akuzawa N, Kurabayashi M. Native valve endocarditis due to *Escherichia coli* infection: a case report and review of the literature. *BMC Cardiovasc Disord* 2018;18:1–9, doi:http://dx.doi.org/10.1186/s12872-018-0929-7.
- [9] Russo TA, Johnson JR. Proposal for a new inclusive designation for extraintestinal pathogenic isolates of *Escherichia coli*: ExPEC. *J Infect Dis* 2000;181:1753–4, doi:http://dx.doi.org/10.1086/315418.
- [10] Morpeth S, Murdoch D, Cabell CH, Karchmer AW, Pappas P, Levine D, et al. Non-HACEK gram-negative bacillus endocarditis. *Ann Intern Med* 2007;147:829–35.
- [11] Soma J, Stakkevold TI, Henriksen AZ. *Escherichia coli* endocarditis of the aortic valve with formation of a paravalvular abscess cavity. *Echocardiography* 2005;22:129–31, doi:http://dx.doi.org/10.1111/j.0742-2822.2005.03178.x.
- [12] Lauridsen TK, Arpi M, Fritz-Hansen T, Frimodt-Møller N, Bruun NE. Infectious endocarditis caused by *Escherichia coli*. *Scand J Infect Dis* 2011;43:545–6, doi:http://dx.doi.org/10.3109/00365548.2011.554432.