CASE REPORT

Neisseria elongata endocarditis of a native aortic valveMohammed Samannodi,¹ Sujit Vakkalanka,² Andrew Zhao,² Michael Hocko²

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SUMMARY

Neisseria elongata is a part of the common bacterial flora of the oropharynx but has caused sepsis, osteomyelitis and infective endocarditis on rare occasions. We report the case of a 56-year-old Caucasian woman who was admitted to hospital with a 5-week history of fever, malaise and fatigue. Two blood cultures grew Gram-negative rods which were confirmed to be *N. elongata* subspecies *nitroreducens* via bacterial DNA sequence analysis. An echocardiogram showed a large mobile vegetation on the right and non-coronary cusps of the aortic valve. The patient underwent aortic valve replacement and antibiotic therapy for 6 weeks. We suggest that clinicians should consider extended antibiotic treatment and early surgical evaluation based on the nature and aggressiveness of *N. elongata*.

BACKGROUND

Neisseria elongata is part of the common bacterial flora of the oropharynx but has caused sepsis, osteomyelitis and infective endocarditis on rare occasions. Initially described by Bovre and Holten¹ in 1969, the potential pathogenicity of this organism was not reported until 1983 by Simor and Salit.² The species was differentiated into three subspecies (*N. elongata* subsp. *nitroreducens*, *N. elongata* subsp. *elongata* and *N. elongata* subsp. *glycolytica*) by Grant *et al*³ in 1990; subsequent literature provided evidence identifying *N. elongata* subsp. *nitroreducens* as the primary pathogenic subspecies. A total of 23 cases of *N. elongata*-related infective endocarditis have been reviewed, with our study being the latest. Eighteen cases were summarised in an earlier study by Hsiao *et al* in 2008.⁴⁻⁶ Our literature review revealed four additional cases since then.^{4 7-9} These four cases and our case described in this report are summarised in table 1.

CASE PRESENTATION

A 56-year-old Caucasian female patient was admitted to the Sisters of Charity Hospital, Buffalo, with a 5-week history of fever, malaise and fatigue. Three days prior to the admission, the patient was seen in the emergency department for fever and asymptomatic bacteriuria. Blood and urine cultures were sent at that time and the patient was discharged home on the same day with a 5-day course of ciprofloxacin. There was a history of travel to Germany a few weeks prior to this illness. She had no history of intravenous drug abuse, recent dental procedures or congenital heart diseases. On admission, the temperature was 39.2°C, heart rate

94 bpm, blood pressure 113/46 mm Hg and respiratory rate 18/min. Heart sounds were normal with no murmurs. There was neither evidence of cardiac failure nor peripheral stigmata of infective endocarditis. The rest of her dental, chest, abdomen and neurological examination was unremarkable. There were no signs of meningeal inflammation. She had a leucocyte count of 12 000/mm³ (88% neutrophils with 10% bands), a platelet count of 281 000/mm³, a C reactive protein level of 224 mg/L and an erythrocyte sedimentation rate of 107 mm/h. The results of liver and renal function tests were normal. Urine analysis revealed moderate blood and trace protein. An ECG showed only sinus tachycardia. CTs of the head, chest and abdomen were unremarkable. A transthoracic echocardiogram showed an ejection fraction of 60% and a large mobile vegetation, 9 mm×4 mm, was seen on the right and non-coronary cusps of the aortic valve with moderate aortic valve regurgitation (figures 1 and 2). Two blood cultures were performed; the first was performed 3 days prior to admission in the emergency department and the second at the time of admission, and both returned positive for Gram-negative rods. The urine culture that was performed 3 days prior to admission did not show any growth. Intravenous ceftriaxone 1 g was started during admission. Two days after admission, the Gram-negative rods were identified as *N. elongata* subspecies *nitroreducens* via bacterial DNA sequence analysis. The organism was antibiotic susceptible. After 1 week, two additional blood cultures were performed and returned negative. The patient was discharged home on intravenous ceftriaxone to complete 6 weeks duration of therapy.

Five days later, the patient was readmitted with new onset of congestive heart failure (New York Heart Association Class IV). At that time, three more blood cultures were drawn but returned negative. A transoesophageal echocardiogram showed an ejection fraction of 40%, vegetation on the two cusps of the aortic valve, severe aortic regurgitation with a mean gradient of 5 mm Hg and a hypokinetic inferior septum (figure 3). After 1 week, the patient underwent a successful aortic valve replacement with a pericardial tissue heart valve. The surgical report revealed a very myxomatous valve with destroyed cusps and a phlegmon in the annulus at the junction between the right and non-coronary cusps. A week after the operation, the patient was discharged to subacute rehabilitation on intravenous ceftriaxone to complete the full 6-week duration of treatment.

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Table 1 Summary of the four new cases reported from 2008 to 2015

Reference	Age (years)	Risk factors	Number of positive blood cultures	Subspecies	Echo findings	Duke's criteria ¹⁰	Medication and duration	Complications	Surgery
Hsiao <i>et al</i> ⁴	42	Dental procedure	2 of 7	Glycolytica	Veg on MV, MR	1 major, 3 minor	Penicillin, 1 week Gentamicin, 1 week Ceftriaxone, 7 weeks	Thalamic infarct, splenic abscess	MVR
Yoo <i>et al</i> ⁹	27	Cellulitis	3 of 3	Nitroreducens	Veg on TV, VSD	2 major	Cefazolin, 1 day Vancomycin, 2 weeks	None	None
Herbert ⁷	43	None	2 of 2	Nitroreducens	Veg on MV	2 major	Ciprofloxacin, 7 weeks	None	None
Osuka <i>et al</i> ⁶	78	None	2 of 3	Nitroreducens	Veg on AV, AR	1 major, 3 minor	Meropenem, 4 days Ceftriaxone, 2 weeks Ampicillin, 2 weeks	None	AVR
Samannodi <i>et al</i> (2016)	56	Recent travel	2 of 2	Nitroreducens	Veg on AV, AR	2 major, 1 minor	Ceftriaxone 6 weeks	CHF	AVR

AR, aortic regurgitation; AV, aortic valve; AVR, aortic valve replacement; CHF, congestive heart failure; MR, mitral regurgitation; MV, mitral valve; MVR, mitral valve replacement; TV, tricuspid valve; VSD, ventricular septal defect.

INVESTIGATIONS

- Blood cultures
- Transthoracic two-dimensional echocardiogram
- Transoesophageal echocardiogram

TREATMENT

- Aortic valve replacement surgery
- Medical management of the heart failure with diuretics before the surgery
- Antibiotics for 6 weeks for the infective endocarditis treatment, continued after surgery

OUTCOME AND FOLLOW-UP

- The patient had no recurrence of heart failure
- One and half year follow-up has been uneventful.

DISCUSSION

We report a case of a rare causative microorganism of infective endocarditis of a native aortic valve—*N. elongata* subsp. *nitroreducens*—which was identified and confirmed by means of DNA sequence analysis. This organism is non-motile, oxidase positive,

catalase negative and reduces nitrates.^{3 11} *Neisseria* endocarditis usually results in acute febrile illness with large valvular vegetations and severe cardiac and systemic complications such as systemic embolisation, thrombotic thrombocytopenic purpura, heart failure and myocardial abscesses.^{4 12 13}

In our case, the patient presented to us with acute febrile endocarditis and large mobile vegetation on the native aortic valve with moderate aortic regurgitation. Initially, a two-dimensional echocardiogram was performed to look for foci of infection. During the first admission, the patient was stable with a controlled infection with no evidence of heart failure, systemic embolisation or severe valvular dysfunction. On the basis of these findings, a transoesophageal echocardiogram was not performed. However, on the basis of the European Society of Cardiology guidelines and the presence of large vegetations and aortic regurgitation found in the transthoracic echocardiogram, a transoesophageal echocardiogram should have been part of the initial assessment of this patient. We also did not consider surgical evaluation during the first admission based on the patient's clinical status, but as a matter of fact the International Collaboration on Endocarditis recommended that optimal treatment is early surgery combined with long-term antibiotic therapy for infective endocarditis due to non-HACEK (*Haemophilus*, *Aggregatibacter*, *Cardiobacterium*, *Eikenella*, *Kingella*) Gram-negative bacteria.¹⁴ Finally, although this was

Figure 1 Transthoracic two-dimensional echocardiography showing large vegetation on the aortic valve. Size of the vegetation is 9 mm×4 mm. LV, left ventricle; Ao, aorta; RV, right ventricle; LA, left atrium.

Figure 2 Transthoracic two-dimensional echocardiography showing moderate aortic regurgitation. LV, left ventricle; Ao, aorta; RV, right ventricle; LA, left atrium.

Figure 3 Transoesophageal echocardiography showing vegetation on the two cusps of the aortic valve. LV, left ventricle; Ao, aorta; AV, aortic valve.

not done at the time, the patient should have also been evaluated according to the Outpatient Parental Antibiotic Therapy (OPAT) guidelines after the first week of admission in order to determine whether the extended antibiotic regimen can be completed in the outpatient setting.¹⁵

Based on the previous literature including our case, *N. elongata* endocarditis is usually an aggressive form of endocarditis, many of which required valve replacement. Three out of the 23 documented cases required cardiac surgery.^{2–4 8 12 16–21} Conversely, it must also be noted that 10 out of the 23 cases yielded positive patient outcomes with only extended antibiotic therapy.^{5–7 9 11 22–26} According to the European Society of Cardiology guidelines, a transoesophageal echocardiogram should be a part of the initial assessment of these patients in order to provide a thorough surgical evaluation and to assess the extent of infection, size of vegetation and any valvular dysfunction.²⁷ In addition, it is evident that the aortic and mitral valves are the most common valves affected by *N. elongata* with 11 cases documenting involvement of the mitral valve^{2–4 7 17 19 21–24} and

10 cases of the aortic valve.^{8 11 12 16 18 20 24–26} On the basis of the aggressive nature of this organism, we suggest that clinicians should consider extended antibiotic treatment and early surgical evaluation.

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Competing interests None declared.

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Learning points

- ▶ Although a component of the oropharyngeal bacterial flora, *Neisseria elongata* can be an aggressive organism, causing osteomyelitis, sepsis and infective endocarditis.
- ▶ *N. elongata* infective endocarditis most commonly affects the mitral and aortic valves.
- ▶ A transoesophageal echocardiogram should be performed as part of the initial assessment in patients with *N. elongata* infective endocarditis in order to assess the extent of infection, size of vegetation and valvular function.
- ▶ Most patients with non-HACEK Gram-negative bacteria like *N. elongata* infective endocarditis require prolonged antibiotic therapy and early surgical evaluation.
- ▶ In patients with infective endocarditis, the Outpatient Parental Antibiotic Therapy (OPAT) guidelines should be referenced before discharging patients on ambulatory antibiotic therapy.

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