



**HAL**  
open science

## Infective endocarditis due to *Neisseria elongata*: A case report and literature review

M. Banjari, E. Haddad, I. Bonnet, L. Legrand, F. Cohen, E. Caumes, V. Pourcher

### ► To cite this version:

M. Banjari, E. Haddad, I. Bonnet, L. Legrand, F. Cohen, et al. Infective endocarditis due to *Neisseria elongata*: A case report and literature review. *Infectious Diseases Now*, 2021, 10.1016/j.idnow.2021.01.013 . hal-03268520

**HAL Id: hal-03268520**

**<https://hal.sorbonne-universite.fr/hal-03268520>**

Submitted on 23 Jun 2021

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

## **Abstract**

**Introduction:** *Neisseria elongata* (NE), a Gram-negative, rod-shaped organism, was previously thought to be non-pathogenic. However, in recent years it has become increasingly recognized as a rare cause of infective endocarditis. Here, we report a case of NE infective endocarditis and a review of literature.

**Objectives:** To describe a case of NE endocarditis, and to review the literature for any similar cases of this rare condition.

**Case report :** Our patient is a 77 year-old healthy female patient who was found to have a mitral valve endocarditis with valve regurgitation.

**Discussion :** NE endocarditis is a rare condition which typically affects the left cardiac chambers and is associated with high risk of embolization. A literature review retrieved 35 other cases.

**Conclusions :** Our report shows the rarity of NE endocarditis as only few cases have been reported. The bacterium has similarity with the HACEK group organisms and can potentially causes infective endocarditis.

**Keywords:** Infective endocarditis, mitral valve, *Neisseria elongata*, Gram-negative bacterial infection, *Neisseria* species

## **Introduction**

*N. elongata* is an aerobic Gram-negative organism. While ordinarily a commensal organism of the human oropharyngeal flora, it has been recognized lately as an important pathogen responsible for serious infections including infective endocarditis(1).

We report a case of *N. elongata* native mitral valve endocarditis complicated by systemic embolization and a review of the relevant literature.

## **Case report**

This is a case of a 77-year-old-female patient who presented to the outpatient clinic of internal medicine department with a history of a fever up to 40°C, a dyspnea and a neck pain. Her previous medical and surgical history were irrelevant, and she did not take any chronic medication. Due to the persistence and worsening of her symptoms, she was admitted to the medical ward for further investigation.

Physical examination revealed a systolic murmur at the mitral area without any signs of heart failure. She suffered from worsening mechanical cervical pain.

Laboratory tests demonstrated a leukocytosis (15,420/L, 13,140G/L neutrophils) and elevation of inflammatory markers (C Reactive Protein 123 mg/ml, Procalcitonin 2.8ng/mL) along with anemia (hemoglobin 7.5 g/dl). Hepatic and renal functions were within normal range. Four sets of blood cultures were obtained on admission, all of which came back positive the same day on direct microscopic examination with Gram negative bacteria and grew a *Neisseria elongata* (Fig.1). Due to technical issues, we could not identify the subspecies of our patient. Transthoracic and transesophageal echocardiography showed

vegetation of 10 mm at the posterior leaflet of the mitral valve with mild regurgitation (3/4) and posterior valve prolapse. No abscess was seen.

Piperacillin/tazobactam 4g IV every 6h and amikacin (total of 4 injections at 25mg/kg) were started after obtaining blood cultures results and the treatment was adapted with the association of Cefotaxime and Levofloxacin.

Total body computerized tomography scan showed splenic infarcts in subcapsular region. Cerebral and cervical Magnetic resonance imaging showed inflammatory infiltration in the peri-vertebral area without any collection or signs of spondylodiscitis and subarachnoid hemorrhage. A cerebral arteriography was performed and eliminated the presence of mycotic aneurysms. Follow-up cardiac ultrasound after one month was stable. Dental exam revealed the existence of 7 infected teeth which were treated accordingly. Endocarditis was cured and no relapse appeared after 18 months of follow-up.

We reviewed PubMed<sup>®</sup> for cases of NE endocarditis using keywords like endocarditis, aortic valve, mitral valve, *Neisseria elongata* and Gram-negative bacterial infection. The articles were reviewed to gather information about patients' demographics, preexisting heart diseases, and treatment options. A total of 36 reported cases, including our case, were identified. All cases were analyzed (Table 1) (2-35). The reported age was in median 52 years (range 7–82 years). All cases involved the aortic or mitral valve except for one case which involved the tricuspid valve (3). Of the 36 cases, 19 (52%) had a preexisting valve condition including prosthetic valves. 11 of the 36 cases (30.5%) had a dental procedure preceding the infection. The most common subspecies was *nitroreducens*, including 7 cases of CDC group M-6, accounting for 70% of cases. Surgical valve replacement was required in 15 (41 %) of 36 patients. *N. elongata* is susceptible to a wide range of antimicrobial agents, with variable susceptibility to penicillin. Although fluoroquinolones were used in 6 cases, the vast majority

of patients were treated with a third-generation cephalosporin, benzylpenicillin or ampicillin/amoxicillin, usually combined with gentamicin in the initial phase. Despite the presence of embolic complications in one third of patients, most of them had a favorable outcome.

## **Discussion**

*Neisseria elongata* was described by Bøvre and Holten in 1970 as a rod-shaped member of the family Neisseriaceae. Later workers reported isolates of CDC group M-6, now known as *N. elongata* subsp. *nitroreducens*, as early as 1964(2). It now contains three subspecies, *N. elongata* subsp. *elongata*, *N. elongata* subsp. *glycolytica*, and *N. elongata* subsp. *nitroreducens*. Of these, *N. elongata* subsp. *nitroreducens* is most frequently associated with invasive disease. This organism is non-motile, oxidase positive, catalase negative, and reduces nitrates which make it different from the other two subspecies.

Our report demonstrates a rare causative microorganism of infective endocarditis of a native mitral valve with *N. elongata*. *Neisseria* sp. endocarditis usually results in acute febrile illness with large valvular vegetations, severe cardiac and systemic complications such as systemic embolization, heart failure and myocardial abscesses (4,5). It is of interest that *N. elongata* endocarditis has been reported to cause frequent systemic embolization and valve destruction (5).

Mycotic aneurysms and septic embolism are well-known complications of infective endocarditis including those caused by many species of *Neisseria*. In a review of the literature on *N. mucosa* endocarditis, Ingram et al. found that 7 of 13 patients (54%) had major embolic events(6). Similarly, another study analyzed 40 well-documented cases of gonococcal

endocarditis and found evidence of major systemic embolization in 9 patients (22%), including emboli to cerebral, splenic, and femoral vessels (7). *Kingella* species, which belong to the family *Neisseriaceae* and are closely related to *N. elongata* subsp. *nitroreducens*, cause endocarditis that is associated with vascular complications in about half of the patients, including strokes in a quarter of them (7). In our review, about one third of cases (n=12), a systemic embolism occurred with cerebral and splenic emboli accounting for most cases.

*Neisseria elongata* is similar to the HACEK group organisms (*Haemophilus*, *Aggregatibacter*, *Cardiobacterium*, *Eikenella*, and *Kingella*) that are also gram-negative coccobacillary organisms found in normal oropharyngeal flora, grow slowly, and have an enhanced propensity to cause endocarditis. *Neisseria elongata* can be easily mistaken for *Kingella* sp. and occasionally *Eikenella* sp. in the preliminary microbiologic reports but can be distinguished on full biochemical profile and rDNA sequencing. Similar to infective endocarditis with the HACEK organisms, *N. elongata* endocarditis presents as a subacute course and is often cured with intravenous antibiotics alone. It has a significant embolic risk and is associated with low mortality.

Conclusion:

*N. elongata* endocarditis is rarely reported. Our report expands the range of infection caused by this organism. *Nitroreducens* is the most common subspecies. It has similarity with the HACEK group organisms and should be considered in IE caused by gram-negative organisms as it can potentially causes a severe disease with multiple complications.

## Declarations

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declarations of interest: none.

Availability of data and material: NA

Code availability: NA

Ethical Approval: ethics approval was not required for this systematic review.

Consent to Participate: Written informed consent was obtained from the patient for publication of this case report.

## References

1. Wong JD, Janda JM. Association of an important *Neisseria* species, *Neisseria elongata* subsp. *nitroreducens*, with bacteremia, endocarditis, and osteomyelitis. *J Clin Microbiol.* 1992;30(3):719–20.
2. Haddow LJ, Mulgrew C, Ansari A, Miell J, Jackson G, Malnick H, et al. *Neisseria elongata* endocarditis: Case report and literature review. *Clin Microbiol Infect* [Internet]. 2003;9(5):426–30. Available from: <http://dx.doi.org/10.1046/j.1469-0691.2003.00533.x>

3. Bousquet A, Soler C, Martinaud C, Mac Nab C, Perrier E. Endocarditis and spondylodiscitis due to *Neisseria elongata* subsp. *nitroreducens*. *Med Mal Infect*. 2013;43(10):435–7.
4. Cervera JI, Todolí JA, Sauquillo JM, Calabuig E. [Endocarditis due to the *Neisseria elongata* subspecies *nitroreducens*]. Vol. 22, *Enfermedades infecciosas y microbiología clinica*. Spain; 2004. p. 556–7.
5. Andersen BM, Weyant RS, Steigerwalt AG, Moss CW, Hollis DG, Weaver RE, et al. Characterization of *Neisseria elongata* subsp. *glycolytica* isolates obtained from human wound specimens and blood cultures. *J Clin Microbiol*. 1995;33(1):76–8.
6. Ingram RJ, Cornere B, Ellis-Pegler RB. Endocarditis due to *Neisseria mucosa*: two case reports and review. *Clin Infect Dis an Off Publ Infect Dis Soc Am*. 1992 Aug;15(2):321–4.
7. Jenny DB, Letendre PW, Iverson G. Endocarditis due to *Kingella* species. Vol. 10, *Reviews of infectious diseases*. United States; 1988. p. 1065–6.
8. Nawaz T, Hardy DJ, Bonnez W. *Neisseria elongata* subsp. *elongata*, a case of human endocarditis complicated by pseudoaneurysm. *J Clin Microbiol*. 1996 Mar;34(3):756–
9. Hofstad T, Hope O, Falsen E. Septicaemia with *Neisseria elongata* ssp. *nitroreducens* in a patient with hypertrophic obstructive cardiomyopathia. *Scand J Infect Dis*. 1998;30(2):200–1.



10. Lundgren B, Teglbjærg LS, Slotsbjerg T, Bruun B. Two cases of endocarditis caused by *Neisseria elongata* subspecies *nitroreducens* and phenotypic differentiation from *Kingella denitrificans*. *Clin Microbiol Infect*. 1998;4(9):514–8.
11. Apisarnthanarak A, Dunagan WC, Dunne WM. *Neisseria elongata* subsp. *elongata*, as a cause of human endocarditis. *Diagn Microbiol Infect Dis*. 2001;39(4):265–6.
12. Hsiao JF, Lee MH, Chia JH, Ho WJ, Chu JJ, Chu PH. *Neisseria elongata* endocarditis complicated by brain embolism and abscess. *J Med Microbiol*. 2008;57(3):376–81
13. Hoshino T, Ohkusu K, Sudo S, Hiromichi N, Ishiwada N, Ezaki T, Kohno Y. *Neisseria elongata* Subsp. *nitroreducens* Endocarditis in a Seven-Year-Old boy (multiple letters). *Pediatr Infect Dis J*. 2005;24(4):391–2.
14. Evans M, Yazdani F, Malnick H, Shah JJ, Turner DPJ. Prosthetic valve endocarditis due to *Neisseria elongata* subsp. *elongata* in a patient with Klinefelter's syndrome. *J Med Microbiol*. 2007;56(6):860–2.
15. Picu C, Mille C, Popescu GA, Bret L, Prazuck T. Aortic prosthetic endocarditis with *Neisseria elongata* subspecies *nitroreducens*. *Scand J Infect Dis*. 2003;35(4):280–2.
16. Noheria A, Anderson PW, Tapia-Zegarra GG, Baddour LM, Wilson WR. Infective endocarditis due to *neisseria elongata*. *Infect Dis Clin Pract*. 2010;18(6):355–8.
17. Dominguez EA, Smith TL. Endocarditis Due to *Neisseria elongata* Subspecies *nitroreducens* : Case Report and Review . *Clin Infect Dis*. 1998;26(6):1471–3.

18. Yoo YP, Kang K-W, Yoon HS, Yoo S, Lee M-S. Infective Endocarditis Caused by *Neisseria elongata* on a Native Tricuspid Valve. *Texas Hear Inst J*. 2014;41(2):227–30.
19. Herbert DA. Successful Oral Ciprofloxacin Therapy of *Neisseria elongata* Endocarditis. *Ann Pharmacother*. 2014;48(11):1529–30.
20. Sawas T, Hong-Nguyen Y, Woods CJ. *Neisseria elongata* prosthetic valve endocarditis: case report and literature review. *JMM Case Reports*. 2015;2(5):0–3.
21. Osuka H, Ichiki A, Yamamoto M, Kawahata D, Saegusa Y, Oishi T, et al. Native valve endocarditis caused by *Neisseria elongata* subsp. *Nitroreducens*. *Intern Med*. 2015;54(7):853–6.
22. Jenkins JM, Fife A, Baghai M, Dworakowski R. *Neisseria elongata* subsp *elongata* infective endocarditis following endurance exercise. *BMJ Case Rep*. 2015;2015:1–4.
23. Samannodi M, Vakkalanka S, Zhao A, Hocko M. *Neisseria elongata* endocarditis of a native aortic valve. *BMJ Case Rep*. 2016;2016:10–3.
24. Rossella P, Patrizia C, Fabio Oreste T, Renato T, Emanuele G, Vincenzo A, et al. Native Mitral Valve Endocarditis Caused by *Neisseria elongata* subsp. *nitroreducens* in a Patient with Marfan Syndrome: First Case in Italy and Review of the Literature . *Case Rep Infect Dis*. 2016;2016:1–4.
25. Perez RE. Endocarditis with *Moraxella*-like M-6 after cardiac catheterization. *J Clin Microbiol*. 1986;24(3):501–2.

26. Dylewski J. Mixed infection with neisseria elongata subspecies elongata and streptococcus sanguis causing endocarditis. *Infect Dis Clin Pract.* 2014;22(4):32–3.
27. Youssef D, Marroush TS, Levine MT, Sharma M. Endocarditis due to neisseria elongata: A case report and review of the literature. *Germes.* 2019;9(4):188–92.
28. Simor AE, Salit IE. Endocarditis caused by M6. *J Clin Microbiol.* 1983;17(5):931–3.
29. Rose RC, Grossman AM, Giles JW. Infective endocarditis due to the CDC group M6 bacillus. *J Tenn Med Assoc [Internet].* 1990 Dec;83(12):603—604. Available from: <http://europepmc.org/abstract/MED/2287169>
30. Garner J, Briant RH. Osteomyelitis caused by a bacterium known as M6. Vol. 13, *The Journal of infection.* England; 1986. p. 298–300.
31. Kaplan LJ, Flaherty J. Centers for Disease Control Group M-6: A cause of destructive Endocarditis. *J Infect Dis.* 1991;164:822–3.
32. Kociuba K, Munro R, Daley D. M-6 endocarditis: report of an Australian case. *Pathology [Internet].* 1993 Jul;25(3):310—312. Available from: <https://doi.org/10.3109/00313029309066596>
33. Struillou L, Raffi F, Barrier JH. Endocarditis caused by Neisseria elongata subspecies nitroreducens: Case report and literature review. *Eur J Clin Microbiol Infect Dis.* 1993;12(8):625–7.

34. Imperial HL, Joho KL, Alcid D V. Endocarditis due to *Neisseria elongata* subspecies *nitroreducens*. Vol. 20, *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America*. United States; 1995. p. 1431–2.
  
35. Meuleman P, Erard K, Herregods MC, Peetermans WE, Verhaegen J. Bioprosthetic valve endocarditis caused by *Neisseria elongata* subspecies *nitroreducens*. *Infection*. 1996;24(3):258–60.