Fatal outcome of first case of Streptococcus sinensis in infective endocarditis in the Netherlands: a case report

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Background
Infective endocarditis is a relatively common disease in a cardiologist’s daily practice. Nowadays more detailed information about pathogens is provided to us by diagnostics such as MALDI Biotyper Massa Spectrometer. We present a case of endocarditis lenta in which Streptococcus sinensis was identified in the Netherlands for the first time.

Case summary
A 58-year-old man was admitted with high suspicion of endocarditis lenta complicated by severe kidney dysfunction and anaemia. He was treated with penicillin and gentamycin. Transthoracic echocardiogram revealed a large vegetation at the mitral valve and MALDI Biotyper Massa Spectrometer (Microflex) revealed S. sinensis as the pathogen. The patient refused to receive blood transfusions or surgery. Due to cerebral infarction with haemorrhagic transformation, the patient died 8 days after admission.

Discussion
Streptococcus sinensis was described in Hong Kong for the first time and is associated with endocarditis in rheumatic heart disease. To our knowledge, this is the first case reporting a fatal outcome of endocarditis due to this bacterium in the acute phase. In this case, late discovery, disease severity, and under treatment all contributed to the poor outcome. We want to share the knowledge on the existence of this bacteria.

Keywords
Endocarditis lenta • Streptococcus sinensis • Medical microbiology • Infective endocarditis • Case report

Introduction
Infective endocarditis is a relatively common disease in a cardiologist’s daily practice. We present a case of infective endocarditis, with the rare Streptococcus sinensis bacteria. Antibiotic therapy is essential to the treatment of endocarditis. Depending on patient-specific circumstances such as vegetation size and the presence of heart failure or septic emboli, surgical treatment is indicated.1 Worldwide 32–57% of the cases of infective endocarditis are treated with surgery.2,3 In the case, we present there was a clear indication for valve surgery. One of the factors leading the fatal outcome was the refusal of the patient to receive surgery.

Learning points
• Identification on species-level in endocarditis can be performed by MALDI Biotyper Massa Spectrometer (Microflex).
• Streptococcus sinensis is a rare pathogen identified in Eastern-Asia for the first time and associated with endocarditis.

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Case presentation

A 58-year-old East Asian man presented to the emergency room. He complained of tiredness and weight loss for the past 6 months, after a period of high fever, but did not seek any medical help. He had a history of bladder surgery at the age of 20 years and no known cardiac history.

Upon admission, the patient was haemodynamically stable, his temperature was 37.6, and his body mass index was 16.02 kg/m². During auscultation, there was a holosystolic heart murmur grade 3 of 6 at the apex. Blood testing showed C-reactive protein values of 36 mg/L (ref: <10 mg/L), a haemoglobin level of 3.7 mmol/L (ref: 8.0–10.2 mmol/L), and severe kidney dysfunction, with a glomerular filtration rate according to the CKD-EPI formula of 30 mL/min/1.73 m² (ref: >90 mL/min/1.73 m²). Blood cultures were collected and were positive for Streptococcus species 1 day after admission. He was given continuous treatment with penicillin 12 million units/24 h and gentamicin 3 mg/kg once daily. Due to severe kidney dysfunction and a minimal inhibitory concentration (MIC) <0.064 mg/L for penicillin, only three doses of gentamicin were given.1

Transthoracic and additional transoesophageal echocardiography revealed a large irregular vegetation covering the complete atrial side of the posterior mitral valve leaflet, additionally, there was a small mobile structure attached to the aortic root, all supporting the diagnosis of infective endocarditis lenta. There was a severe mitral insufficiency and a global good function of the heart including the left ventricle (Figure 1A and B, and Supplementary material online, Video S1).

All four blood cultures [two BacT/Alert 3D aerobic FA and two BacT/Alert 3D anaerobic FN (Biomérieux)] were positive with Gram-positive cocci. The strain was identified as S. sinensis by the MALDI Biotyper Mass Spectrometer (Microflex) (Bruker), with a score value of 2.28. The MALDI Biotyper identifies microorganisms using MALDI-TOF (Matrix Assisted Laser Desorption Ionization Time of Flight) Mass Spectrometry measuring highly abundant proteins to determine the identity of the microorganism. The MALDI biotyper software compares the peak profile of the tested strain with database entries and calculates a logarithmic score between 0 and 3. In several blood cultures obtained from our patient, the score was consistently over 2.0, which implies a reliable identification on genus and species level.

The isolate grew as tiny grey α-haemolytic colonies on 5% sheep blood agar (COS plate) after incubation of 24 h at 35°C in 4% CO₂-enriched atmosphere. Antimicrobial susceptibility for penicillin and other antibiotics were tested by the EUCAST (European Committee on Antimicrobial Susceptibility Testing) standardized disk diffusion method. The disk diffusion method was performed on Mueller-Hinton agar ±5% defibrinated horse blood and 20 mg/L β-NAD (MH-F), with an inoculum McFarland 0.5 and incubated in 5% CO₂, 35 ± 1°C for 18 ± 2 h. We performed the susceptibility tests both on direct material from the blood culture as well as the bacterial colony. The S. sinensis was penicillin susceptible (MIC 0.064 mg/L). The results were interpreted according to EUCAST criteria for alpha-haemolytic streptococci.

No changes to the antibiotic regime were made. Considering the severity of the mitral insufficiency and the size of the vegetation, the ‘Endocarditis team’ decided that urgent surgery on this valve would be the best treatment and advised to correct the anaemia first. The patient, however, did not wish to receive blood transfusions or surgery out of religious considerations. For this reason, a mental care-taker and psychiatrist were consulted. Although the evaluation of the patient’s decision-making capacity was not concluded, there were no indications for psychiatric problems.

After 6 days, the patient developed a different mental state. For this reason, a computed tomography (CT) scan of the brain was performed in search for cerebral abscesses or infarction. A large infarction of the right frontal hemisphere was found. The neurologist was consulted and he advised us to start with clopidogrel 5 days after the event because there was thrombotic occlusion of the M3 segment of the right middle cerebral artery. However, 3 days later, he developed epileptic seizures and a repeat CT scanning showed a large bleeding in the left hemisphere, probably due to haemorrhagic transformation of a new cerebral infarction (Figure 2). Shortly after this event, the patient died due to brain herniation. The neurosurgeons decided he was inoperable due to his poor condition and the infarct prognosis.

Conclusion/discussion

We report the first case in the Netherlands of infective endocarditis caused by a strain of S. sinensis in a person originating from Eastern-Asia. The discovery of this novel species of viridans streptococcus was reported in 2002 in a case of infective endocarditis in a patient
with chronic rheumatic heart disease in Hong Kong. A few more cases of S. sinensis-associated infective endocarditis were reported in Europe in persons with Caucasian roots. Nevertheless, the majority of patients originate from Eastern-Asia and most patients had a history of congenital or rheumatic heart disease.

Identification of viridans streptococcus at the species level can be difficult and phenotypic identification is not always accurate. However, the MALDI Biotyper Mass Spectrometer (Microflex) 3.1 (Bruker) we used identified this important streptococcus species. Woo et al. proposed in 2008 that this bacteria is closely related to Streptococcus gordonii by GroEL-analysis and to the Streptococcus anginosus and the Streptococcus mitis/sanguinis groups by 16s RNA sequencing. Later on, Teng et al. 2014 performed a whole gene analysis (digital whole genomic DNA–DNA hybridization) and MALDI-TOF mass spectrometry showing that S. sinensis, together with Streptococcus oligofermentans and Streptococcus cristatus form a separate tree in the streptococcus family. All three bacteria are associated with endocarditis. S. sinensis is a commensal organism in the oral cavity and was detected in 22% of saliva samples from healthy volunteers in Hong Kong. This case report showed a severe infective endocarditis lenta with S. sinensis in the Netherlands for the first time. To our knowledge, this is the first case reporting a fatal outcome of endocarditis due to this bacterium in the acute phase. We hypothesize that S. sinensis could have great potential to adhere and colonize heart valves and the endocardium, because no infections with a causative relation to S. sinensis other than endocarditis have been described in the literature. Potentially, persons with a certain (genetic) background are more sensitive to the virulence of S. sinensis.

One of the factors that contributed to the death of the patient is the long time to presentation. Furthermore, the poor performance state, malnourishment, severe anaemia, and severe kidney dysfunction are signifiers of the stage of endocarditis and the nature of its complications. We also the think that undertreatment due to the refusal of the patient to receive surgery or blood products contributed to the fatality of this case. On the other hand, there were no predisposing conditions for endocarditis such as a compromised immune system, rheumatic heart disease, or the presence of a prosthetic valve.

We want to emphasize the need of identification on species-level if blood cultures in endocarditis come out positive. It is important to gather and share knowledge of the potential disastrous outcome of infections with relatively unknown pathogens such as S. sinensis.
Lead author biography

Anne Margje Lisa Naomi van Ommen is a medical doctor working in the cardiology field for two years now. She wishes to become a cardiologist with specific interest in imaging in cardiology. She will start a PhD in 2020 researching early biomarkers in heart failure with preserved ejection fraction and microvascular heart disease.

Supplementary material

Supplementary material is available at European Heart Journal - Case Reports online.

Slide sets: A fully edited slide set detailing this case and suitable for local presentation is available online as Supplementary data.

Consent: The brother of the patient has provided written informed consent for this case report. There was no consent for post-mortem obduction.

Conflict of interest: none declared.

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