CASE REPORT

An aggressive form of *Haemophilus parainfluenzae* infective endocarditis presenting with limb weaknessNaina McCann,¹ Mohamad Fahed Barakat,² Frank Schafer³

¹Department of Infectious Diseases, University College London Hospital, London, UK
²School of Cardiovascular Medicine & Sciences, King's College London, London, UK
³Department of Cardiology, Royal Free London NHS Foundation Trust, London, UK

Correspondence to

Dr Naina McCann,
 naina.mccann@gmail.com

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SUMMARY

We present the case of a 49-year-old man with a bicuspid aortic valve who presented to the emergency department with limb weakness and a fever. Blood tests revealed a fulminant septic process with *Haemophilus parainfluenzae* bacteraemia, anaemia and thrombocytopenia. Imaging revealed a cervical spinal abscess and discitis causing spinal cord compression, in addition to multiple cerebral septic emboli, pleural effusions and ascites. A transoesophageal echocardiogram (TOE) performed post decompression of his spinal collection showed native aortic valve endocarditis with an associated large aortic root abscess. He underwent successful aortic valve surgery and a 6-week course of antibiotic therapy and made an excellent clinical recovery with no long-term complications from his condition.

BACKGROUND

Despite being a relatively common and treatable condition, infective endocarditis still carries a high mortality and morbidity rate.¹ One reason for this is delayed diagnosis due to the non-specific symptoms and signs that it can present with, and the variable nature of the condition. Often patients are diagnosed when they present with complications of the underlying condition such as heart failure, or embolic complications. It is estimated that 25% of patients present with embolic phenomenon at the time of diagnosis, with cerebral embolic the most common.² In these patients with embolic complications, early identification and management of underlying infective endocarditis is vital, as they are at high risk of developing further devastating complications.

We highlight the importance of searching for an underlying diagnosis of infective endocarditis in patients who present with a rare embolic complication of infective endocarditis—spinal abscess formation. This case also highlights the ability of a rare bacterium, *Haemophilus parainfluenzae*, to cause an acute fulminant septic process and multiple complications including septic emboli. Early identification of this bacterium from blood cultures as well as early transoesophageal echocardiography (TOE) is essential in aiding the diagnosis and allowing early commencement of effective treatment.

CASE PRESENTATION

A 49-year-old man presented to the emergency department with a 3-day history of leg weakness

causing him to require assistance to stand, in association with lethargy, reduced appetite and fevers.

He had no medical history except a known bicuspid aortic valve. He was fit and well, a non-smoker who drank a maximum of two cans of beer per week and denied intravenous drug use. He had not undergone any recent procedures or dental work. He had no previous history of infections and had never been admitted to hospital before. He worked in security.

His observations in the emergency department showed he was hypotensive, tachycardic and feverish with a temperature of 38.5°C.

On examination, he was found to be clubbed and have a loud ejection systolic murmur radiating to the carotids. There was a normal jugular venous pressure and no peripheral oedema. His chest was clear and his abdomen was distended with dullness to percussion in the flanks and shifting dullness. Neurological examination revealed global weakness with Medical Research Council grade 4 out of 5 in all limbs, with an otherwise normal examination.

A few days following admission, he developed severe neck pain and stiffness. On examination, there was severe tenderness on palpating his cervical spine and his neck movements were passively and actively limited.

INVESTIGATIONS

On initial presentation in the emergency department, blood tests revealed an underlying septic process with a leucocyte count of $28 \times 10^9/L$ and a C reactive protein of 167 mg/dL. Platelets were low at $19 \times 10^9/L$ and he was anaemic with haemoglobin level of 94 g/L. A blood film review suggested septic consumption of platelets but there was no evidence of disseminated intravascular coagulation. A urine dipstick was positive for blood and protein, with no nitrites or leucocytes.

Initial basic imaging was carried out to investigate the source of presumed sepsis. A chest radiograph revealed small pleural effusions but no consolidation and an abdominal ultrasound demonstrated ascites and pleural effusions, with no bile duct dilatation or evidence of intra-abdominal sepsis. An ECG showed sinus tachycardia with no ST segment changes and a normal PR interval, and this remained the same throughout his hospital stay. Due to the early suspicion of endocarditis, a transthoracic echocardiogram (TTE) was carried out which revealed a bicuspid valve with moderate aortic stenosis and mild aortic regurgitation but no obvious vegetation. Three separate blood cultures taken grew *Haemophilus*

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Video 1 Two-dimensional echocardiographic video showing the opening bicuspid valve with a large vegetation attached.

parainfluenzae, which was fully sensitive. Although Duke's criteria were met and treatment for infective endocarditis was started, confirmed imaging via TOE did not occur until 11 days post initial presentation due to limited availability at our local trust.

An MRI neck was performed secondary to the new-onset severe neck pain and limb weakness and revealed a C2–C3 extradural collection associated with spinal cord compression and a probable underlying C3–C4 discitis. An emergency transfer was arranged to the local neurosurgical centre where he had this evacuated with full recovery of his neurological symptoms. The evacuated collection was sterile, with no growth of organisms. At this centre, an MRI head was carried out which showed multiple cerebral foci consistent with septic emboli.

On return to the local hospital, an urgent TOE was completed which showed a sizeable mass in the vicinity of the fusion raphe between the left coronary cusp and right coronary cusp and a likely forming infective abscess of the posterior aortic root (videos 1 and 2).

DIFFERENTIAL DIAGNOSIS

The initial presentation in the emergency department was highly suggestive of a fulminant septic process in a young, healthy

Video 2 Three-dimensional echocardiographic video showing the aortic valve with vegetation attached.

patient, and therefore the differential diagnosis at that time included atypical pneumonia, infective endocarditis, intra-abdominal sepsis or meningococcal or streptococcal septicæmia.

The MRI neck imaging together with the MRI head were suggestive of an underlying process producing septic emboli. The differentials for this include infective endocarditis, septic thrombophlebitis and central venous catheter-associated infections. However, the positive blood cultures for *Haemophilus parainfluenzae* linked with the patients' history of a bicuspid aortic valve were highly suspicious of an underlying infective endocarditis process, despite no vegetation being visualised on TTE. Furthermore, using the modified Duke's criterion, the patient had two positive major criteria (new valvular regurgitation and positive blood cultures with a typical micro-organism) therefore meeting the clinical criteria for a diagnosis of infective endocarditis.

TREATMENT

The mainstay of treatment for infective endocarditis is antibiotic treatment, but approximately 50% of patients will need surgery and valve replacement at some point.

Initially, our patient was treated for sepsis of unknown cause with a broad-spectrum antibiotic: intravenous piperacillin/tazobactam. When the blood cultures revealed the underlying causative organism, the antibiotics were changed to ceftriaxone and ciprofloxacin, and then gentamicin and ceftriaxone, after discussion with the hospital microbiologist.

As spinal cord compression is a neurosurgical emergency, this took priority in the patient's treatment and his urgent transfer to a neurosurgical centre for evacuation ensured he did not suffer any neurological consequences. However, this delayed his TOE until return to the local hospital, where the diagnosis of infective endocarditis was radiologically confirmed and the extent of the cardiac disease revealed.

The patient was reviewed by the cardiac surgeons while continuing on appropriate antimicrobial therapy. Due to the uncontrolled and persisting infection in the form of an aortic root abscess and ongoing fever despite intravenous antibiotic therapy treatment, he was transferred to a specialist cardiac unit for urgent mechanical aortic valve replacement, debridement and patching of the aortic root abscess, and a closure of a small ventricular septal defect (identified during surgery), after 2 weeks of antibiotic therapy. Post successful cardiac surgery he was transferred back to the local hospital and completed a total of 6 weeks of antibiotic therapy and did not require a pacemaker.

OUTCOME AND FOLLOW-UP

He made an excellent recovery from this condition and its complications, suffering no long-term effects. He is being followed up regularly in the cardiology department with regular echocardiography and blood tests.

DISCUSSION

Haemophilus parainfluenzae is a Gram-negative coccobacilli that is found in the normal flora of the oropharynx. It is a rare cause of infective endocarditis, one of the HACEK group of fastidious Gram-negative organisms (*Haemophilus spp.*, *Aggregatibacter spp.*, *Cardiobacterium hominis*, *Eikenella corrodens* and *Kingella kingae*). Overall this group are responsible for between 1% and 3% of all infective endocarditis cases.³

Case reports and descriptions in the literature suggest that endocarditis caused by *Haemophilus parainfluenzae* is usually associated

with large vegetations and septic emboli^{4 5} as demonstrated in our case. However, it is also described that endocarditis caused by this species usually affect the mitral valve and present in an indolent manner.⁶ In contrast to this, our case highlights the ability of *Haemophilus parainfluenzae* to present in an acutely aggressive manner, causing septic shock and multiple complications at presentation. Two recent case reports present similar findings, suggesting that this species now needs to be considered in someone presenting in septic shock with a suspicion of endocarditis.^{7 8}

The importance of excluding infective endocarditis in patients presenting with discitis has been highlighted before, with one study reporting 4 out of 30 presentations of infectious discitis found to have underlying infective endocarditis.⁹ However, to the best of our knowledge, there have been no reported cases of *Haemophilus parainfluenzae* infective endocarditis causing a spinal abscess and discitis. The most common causative organisms for this presentation are the *Streptococcus* species.

Despite ongoing antibiotic therapy, our patient had persistent infection and fevers. It is known that perivalvular extension of infective endocarditis is the most common reason for persisting infection and associated with a higher mortality rate. These patients have high rates of surgery and higher rates of mortality (41%), as well as higher risk of septic embolisation.¹⁰ Early surgery in these patients (within the first 2 weeks) is challenging but has been shown to reduce the risk of further embolic complications and improve outcomes.^{11 12}

Overall, our case highlights the ability of *Haemophilus parainfluenzae* to cause a fulminant septic condition, severe

valvular lesions and abscess formation leading to multiple septic emboli. Discitis and spinal abscess is a potential complication of this condition. Early recognition of the underlying process and involvement of the multidisciplinary team (microbiologist, cardiologist, radiologist, neurosurgeon and cardiac surgeon) are vital to allow prompt surgical intervention to prevent further catastrophic embolic complications.

Contributors NM performed the research and write-up of the case report. MFB was responsible for the planning and initiation of the project as well as obtaining all the relevant clinical information on the case. FS obtained the echocardiographic images, supervised the project and edited the write-up.

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Learning points

- ▶ *Haemophilus parainfluenzae* infective endocarditis can result in a fulminant septic condition.
- ▶ An epidural abscess or discitis is a rare but important complication of infective endocarditis.
- ▶ In patients presenting with an epidural abscess, an underlying diagnosis of infective endocarditis should be considered.
- ▶ Aortic root abscesses are associated with increased septic embolisation and persisting infection and may expedite the need for surgery.
- ▶ An early multidisciplinary approach is vital for the management of such cases.

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