CASE REPORT

Proteus endocarditis in an intravenous drug userRohan Goel,^{1,2} Baskar Sekar,² Mark N Payne²¹Cardiff University, Cardiff, UK
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SUMMARY

Infective endocarditis (IE) is a life-threatening condition with adverse consequences and increased mortality, despite improvements in treatment options. Diagnosed patients usually require a prolonged course of antibiotics, with up to 40–50% requiring surgery during initial hospital admission. We report a case of a 42-year-old intravenous drug user who presented feeling generally unwell, with lethargy, rigours, confusion and a painful swollen right leg. He was subsequently diagnosed with *Proteus mirabilis* endocarditis (fulfilling modified Duke criteria for possible IE) and deep vein thrombosis (DVT). He was successfully treated with single antibiotic therapy without needing surgical intervention or requiring anticoagulation for his DVT. *Proteus* endocarditis is extremely uncommon, with a limited number of case reports available in the literature. This case illustrates how blood cultures are invaluable in the diagnosis of IE, especially that due to unusual microorganisms. Our case also highlights how single antibiotic therapy can be effective in treating *Proteus* endocarditis.

BACKGROUND

Infective endocarditis (IE) is a life-threatening condition. If left untreated, it can have adverse consequences including elevated mortality. The usual treatment involves a prolonged course of antibiotics with up to 40–50% of patients needing valve replacement during initial hospital admission.¹ Staphylococcal and fungal infections are much more frequent in prosthetic valve endocarditis, whereas *Streptococcus viridans* remains the commonest organism affecting native valves. *Proteus mirabilis* is a Gram-negative rod that usually affects the renal tract, but some cases of wound infection and sepsis have been reported. This patient had *P. mirabilis*, which is a rare cause of endocarditis, grow in his blood cultures; only a few cases have been reported in the literature. In a study looking at 2761 cases of definite endocarditis, 0.1% were found to be caused by *Proteus* spp.^{2,3} Our patient was given a single antibiotic, to which he responded well without the need for surgery; this has only been shown, in one published case, to be effective with ceftriaxone.^{2,4} Guidelines suggest that two antibiotics be used,⁵ although there is little evidence to support this strategy.

CASE PRESENTATION

A 42-year-old man presented, in June 2015, feeling generally unwell, with lethargy and a painful right leg. His leg had been swollen for a couple of days and a collateral history indicated he had been confused and had a fever with rigours the night prior to admission. He denied having a productive cough, haemoptysis, chest pain, breathlessness, abdominal pain or urinary symptoms.

On admission, he was found to be tachycardic (heart rate 106 bpm) but normotensive (blood pressure 103/62 mm Hg). He had a respiratory rate of 20 breaths/min, O₂ saturations 96% on room air and a temperature of 37.3°C. On clinical examination, he had no splinter haemorrhages. His right leg was swollen with severe tenderness in his thigh, suggestive of deep vein thrombosis (DVT). He was also found to have a discharging sinus in his right thigh. Cardiovascular system examination revealed a pansystolic murmur at the left sternal edge and chest auscultation revealed crepitations at the right base. At the time of admission he was smoking (10/day) and claimed that he had not injected heroin for 4 months. His regular medications included methadone and mirtazapine. His medical history included hepatitis C infection and a bioprosthetic tricuspid valve replacement (TVR) in 2013, for severe tricuspid regurgitation secondary to staphylococcal endocarditis. Unfortunately, he had continued to inject heroin and developed staphylococcal prosthetic valve endocarditis, which was successfully treated with a prolonged course of antibiotics in June and October 2014. He was declined further valve surgery following his second presentation with staphylococcal endocarditis.

INVESTIGATIONS

Blood samples on admission showed the patient's C reactive protein elevated at 216 mg/L (reference value 0–5 mg/L), white cell count $11.0 \times 10^9/L$ (reference value $4–11 \times 10^9/L$) with neutrophils $9.4 \times 10^9/L$ (reference value $1.7–7.5 \times 10^9/L$) and a venous lactate of 2.4 (reference value 0.5–2.2 mmol/L). Owing to his swollen leg, an ultrasound Doppler of his right leg was performed, showing occlusive thrombus in the right common femoral vein (figure 1). Owing to the crepitations in his chest, a chest X-ray was performed, which showed patchy consolidation in the right lower zone with an air bronchogram. The main pulmonary artery appeared normal and there were no other signs (such as pulmonary oligoemia) suggestive of pulmonary embolism. The patient had a transthoracic echocardiogram, showing bioprosthetic TVR in situ with significant regurgitation but no obvious vegetations (figure 2). A wound swab taken from his discharging sinus did not show any growth. He had two sets of blood cultures (taken 30 min apart), which showed *P. mirabilis* sensitive to cephalexin, gentamicin, piperacillin/tazobactam and amoxicillin. A repeat set of blood cultures was sent after the start of amoxicillin—this set did not show any growth.

DIFFERENTIAL DIAGNOSIS

IE and DVT.

CrossMark

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Figure 1 Ultrasound scan of the patient's right leg, showing occlusive thrombus in the common femoral vein.

TREATMENT

Prosthetic valve endocarditis was highly suspected, given the history of continued intravenous drug use and previous admissions with prosthetic valve endocarditis. Initially, the patient was started on intravenous gentamicin, vancomycin and piperacillin/tazobactam due to the history of staphylococcal endocarditis, however, this was soon changed to intravenous amoxicillin when the blood culture results became available. He fulfilled modified Duke criteria for possible IE (positive blood cultures and predisposition to endocarditis). He was given 4 weeks of amoxicillin intravenously before being switched to oral amoxicillin for a further 14 days. Owing to his positive ultrasound scan showing DVT, he was anticoagulated with warfarin.

OUTCOME AND FOLLOW-UP

The patient made a good recovery and, at 2-month follow-up, he remained stable; warfarin was switched to a new oral anticoagulant, rivaroxaban, at the patient's request.

Figure 2 Transthoracic echocardiogram (apical five-chamber view) showing stented bioprosthetic tricuspid valve replacement with significant regurgitation and no evidence of vegetations.

DISCUSSION

IE due to *P. mirabilis* is extremely uncommon, with a limited number of case reports available in the literature. A previous review of eight patients² showed that native valves were affected in the majority of cases (7/8). Most of the patients received dual antibiotic therapy as per recommendations, with only two requiring surgical valve replacement. The best antibiotic treatment for these patients is currently unknown, but guidelines from the American Heart Association (2005)⁵ recommend dual antibiotic therapy with a combination of a penicillin or broad-spectrum cephalosporin with an aminoglycoside, due to synergism, however, there is no evidence to support this regimen. We report an extremely uncommon case of prosthetic valve endocarditis, due to *P. mirabilis*, that was successfully treated with a single antibiotic.

Learning points

- ▶ *Proteus mirabilis* is a rare cause of infective endocarditis.
- ▶ Blood cultures play an important part in correct treatment of endocarditis.
- ▶ Guidelines recommend dual antibiotic therapy, however, this is the second case report showing that a single antibiotic can be effective without the need for surgery.
- ▶ European Society of Cardiology guidelines suggest that a second set of blood cultures be taken after the start of antibiotic therapy to check response to treatment.¹

Contributors The article was co-written by RG and BS and reviewed by MNP.

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