

Reminder of important clinical lesson

Streptococcus pneumoniae endocarditis on replacement aortic valve with panophthalmitis and pseudoabscess

Stephen O'Brien,¹ Mark Dayer,² James Benzimra,³ Susan Hardman,⁴ Mandie Townsend⁵¹Care of the Elderly, Musgrove Park Hospital, Taunton, Somerset, UK;²Cardiology Department, Musgrove Park Hospital, Taunton, Somerset, UK;³Ophthalmology Department, Musgrove Park Hospital, Taunton, Somerset, UK;⁴Microbiology Department, Musgrove Park Hospital, Taunton, Somerset, UK;⁵Cardiology Department, Bristol Royal Infirmary, Bristol, Avon, UK**Correspondence to** Dr Stephen O'Brien, stephenobrien@doctors.org.uk**Summary**

A 63-year-old woman with a previous episode of *Streptococcus agalactiae* endocarditis requiring a bioprosthetic aortic valve replacement presented with a short history of malaise, a right panophthalmitis with a Roth spot on funduscopy of the left eye and *Streptococcus pneumoniae* grown from vitreous and aqueous taps as well as blood cultures. She developed first degree heart block and her ECG was suggestive of an aortic root abscess. This gradually resolved over 6 weeks, during which she was treated with intravenous antibiotics. After careful consideration, it is likely that what was thought to be an aortic root abscess was instead an area of perivalvular inflammation.

BACKGROUND

This case illustrates the severe morbidity associated with endocarditis, even when treated promptly. It shows that although endocarditis does often require surgery, some cases can be treated with antibiotics alone. Finally, it shows very clearly the problems that teams and medical decision makers have when faced with equivocal imaging and investigation results, a high level of risk associated with aggressive intervention and a deteriorating patient.

CASE PRESENTATION

A 63-year-old lady, recently retired from keeping holiday cottages, was admitted with a swollen right eye associated with reduced vision for 1 day. She reported a 6 day history of feeling unwell with a cough, and was noted by her general practitioner to have a raised temperature of 38.5°C. Her general practitioner had given her a short course of clarithromycin with no improvement. There was no history of recent dental treatment.

Eight months prior to the current admission she had an episode of infective endocarditis with *Streptococcus agalactiae* and had required a bioprosthetic aortic valve replacement.

On ophthalmic examination, visual acuity was limited to perception of light in the right eye and 6/9 corrected with pinhole in the left eye. Her right eye had a peri-orbital cellulitis with proptosis, gross restriction of ocular motility and a right afferent pupillary defect. The right eye had an endophthalmitis with hypopyon, loss of the red reflex and no fundal view. The left eye was uninflamed but funduscopy revealed intraretinal haemorrhage with overlying white areas – thought to likely be a Roth spot (figure 1). Her temperature was normal on admission, but a swinging pattern quickly became clear. She was haemodynamically stable and the only other abnormal finding was a soft

ejection systolic murmur, loudest over the left sternal edge. Clinically her chest was clear, and she did not have any signs of infection on chest x-ray.

INVESTIGATIONS

Her initial blood tests showed a raised white cell count of $14.2 \times 10^9/l$, accompanied by a neutrophil value of $13.4 \times 10^9/l$ and a C-reactive protein of 143 mg/l. Immediate vitreous and aqueous taps showed gram positive cocci. Blood cultures were taken.

A CT scan of the head showed preseptal soft tissue thickening in her right orbit, as well as increased abnormal signal within the posterior orbital fat. It also showed a degree of mucosal thickening in the right maxillary and sphenoid sinus with no features suggestive of direct orbital invasion. This level of sinus disease is a common incidental radiological finding and less severe than would normally be expected in sinusitis related orbital cellulitis, suggesting a different pathophysiology for the orbital inflammatory changes (figure 2).

Her initial ECG showed T wave inversion (which was not new) with a normal PR interval. However, 2 days later she developed new first degree heart block (PR 270 ms).

An urgent transoesophageal echocardiogram (TOE) demonstrated a well-seated bioprosthetic valve, with an area of thickening just adjacent to the left main stem, suspicious of an abscess. There was no evidence of a paraprosthetic leak or of any vegetations.

DIFFERENTIAL DIAGNOSIS

The diagnosis in this case was felt to be endocarditis affecting the prosthetic aortic valve with secondary involvement of the eye leading to a panophthalmitis. However, although the aortic root looked suspicious, no vegetations were seen and aside from the ophthalmic involvement there were no other manifestations of endocarditis. It is however widely

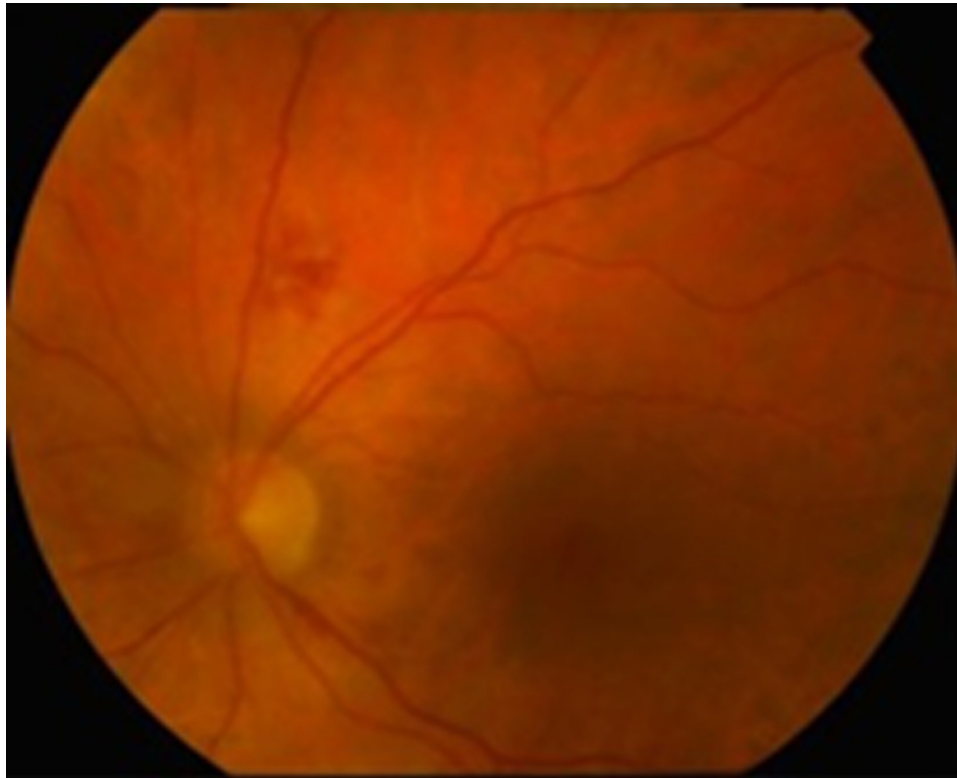


Figure 1 A photograph of the left retina showing an area just superior to the optic disc suggestive of a Roth spot.

noted that small root abscesses are difficult to identify in the presence of prosthetic valves.

Also, although the blood film and systemic malaise could have been explained by a panophthalmitis, intraocular infection in the absence of ocular injury or surgery (endogenous endophthalmitis) does typically arise from haematological spread from a distant focus of infection.

While not considered at the time, the patient does fulfil the Duke criteria for clinical diagnosis of endocarditis. She had a previous episode, a Roth spot, swinging fever, and *Streptococcus pneumoniae* on three sets of blood cultures – three minor criteria and one major criteria, which is sufficient to diagnose endocarditis.

This patient did have some indications for surgery – a likely embolus, a root abnormality and a new onset conduction abnormality. (Other indications include severe heart failure, worsening valve function, persistent bacteraemia or sepsis after 1 week of antibiotics, early endocarditis following valve replacement, perivalvular leak, haemolysis from paraprosthetic leak and others).¹

However, the valve was well-seated, not rocking, and there was no paraprosthetic leak. She was haemodynamically relatively stable. It was therefore felt that immediate surgical therapy was not indicated and further antibiotics alone should be tried. Fortunately, she responded to these and surgical intervention was not necessary.

TREATMENT

The right eye was treated with intravitreal vancomycin and amikacin at the time of vitreous biopsy approximately 1 h after admission, but within 2 days she had lost her sight in that eye.

Three sets of admission blood cultures and also both vitreous and aqueous taps grew *S pneumoniae*, sensitive to penicillin (minimal inhibitory concentration <0.1 mg/l), vancomycin, linezolid and moxifloxacin. Intravenous vancomycin plus a synergistic dose of gentamicin (initially 1 mg/kg three times a day) was given for 6 weeks, as per UK recommendations.² She was allergic to penicillin. Short courses of linezolid and moxifloxacin were also used to treat the endophthalmitis.

OUTCOME AND FOLLOW-UP

Due to the findings of the TOE, she was transferred to a tertiary cardiothoracic surgical centre for further evaluation. While there she developed runs of Mobitz type II and 2:1 block, and had a temporary pacing wire placed. She underwent serial TOEs and CT aortograms and the area of thickening in the aortic root gradually reduced in size. The PR interval returned to normal and the temporary pacing wire was removed.

After 3 weeks, the patient was transferred back to our hospital where she completed her course of antibiotics. At this stage her inflammatory markers had settled to normal, and she was discharged home with a temperature chart and clear advice on what to watch for in future. Final visual acuity in the right eye was no light perception. The Roth spot in the left eye had resolved and visual acuity was unchanged from admission. Investigation for an underlying immunological disorder has revealed a monoclonal gammopathy of uncertain significance.



Figure 2 CT scan demonstrating proptosis of the right eye.

DISCUSSION

Endocarditis is a serious, and fortunately rare disease. It is challenging to treat and its complications potentially devastating. Estimates for prevalence in developed countries are around 5 people per 100 000 people per year. Its acute in-hospital mortality is around 15%, and the 1 year mortality is higher, particularly in more older subjects.³ Prosthetic valve endocarditis is becoming increasingly common and has a more severe prognosis (10 year mortality around 40% and a reoperation rate of 20% in various case series).^{2 4}

Endocarditis caused by *S pneumoniae* has been reported to represent between 1 and 3% of all cases (*Staphylococcus epidermidis* or *aureus* is a more common causative organism).^{2 5} *S pneumoniae* as a causative organism was much commoner in the preantibiotic era, at around 15%.⁵ It is commoner in alcoholics and may be associated with meningitis or pneumonia.^{5 6} It often presents with haemodynamic compromise due to valve destruction, similar to other causes of acute endocarditis, and has a high mortality (50% in one case series).⁶ A small percentage of *S pneumoniae* endocarditis affects prosthetic valves: 13% in one series with a median time lapse since valve replacement of 4 years (range 6 weeks – 5 years).⁵

There is no established link between monoclonal gammopathy of uncertain significance and endocarditis. The authors were only able to find two case reports on PubMed

relating to this subject. Given this lack of clear causal evidence, we are unable to state with conviction that it played a role in the patient's infection.

This case helps to highlight some of the more serious effects of endocarditis, including risk of septic emboli originating from the valve. Such emboli can seed to the brain, causing stroke or cerebral abscess, the lungs (septic emboli from right-sided valve disease), the spleen (septic infarcts), the kidney (renal infarcts) and the eye, causing an endophthalmitis if confined to the intraocular structures or more rarely panophthalmitis where intra and extra-ocular structures are affected, as in this case. Infection can also extend locally into the heart, causing fistulae between the vessels or chambers of the heart, and abscesses in the root of the aorta. Endocarditis can also (rarely) cause a wide variety of other cardiac abnormalities, such as Takotsubo cardiomyopathy⁷ and valvular aneurysms.⁸

Endophthalmitis is a rare condition which may be exogenous or endogenous. It may present with a red eye and should be excluded in those with recent ocular surgery/trauma, or who are suspected of having a bacteraemia. Most cases are exogenous, following intraocular surgery or trauma to the eye. Endogenous endophthalmitis represents between 2 and 8% of all cases and occurs due to haematogenous seeding to the eye from a distant source – of these, one case series found nearly 40% of cases to

also have spontaneous bacterial endocarditis.⁹ Other foci include abscesses, meningitis, urinary tract infection, septic arthritis or cellulitis.^{10–11} It may be misdiagnosed as conjunctivitis, acute angle closure glaucoma or non-infectious anterior uveitis, probably due to its rarity.^{10–12} The condition is most often unilateral, and the right eye is more frequently involved than the left, possibly because the right carotid artery provides a relatively direct route to the eye.¹² Gram positive organisms such as streptococci and *S aureus* predominate in Northern Europe and the USA.^{10–12} *S pneumoniae* accounts for between 7% and 11% of all cases of bacterial endogenous endophthalmitis, depending on the case series.^{10–12}

The role of intravitreal antibiotics is well-established in exogenous endophthalmitis as there is poor penetration of antibiotics into the vitreous and aqueous following systemic administration, due to the presence of the blood – ocular barriers.¹³ Endogenous endophthalmitis or panophthalmitis requires systemic treatment for the co-existing bacteraemia, however evidence for the use of intravitreal antibiotic in endogenous endophthalmitis is limited despite a theoretical benefit, and the visual prognosis is poor.

The case also emphasises that although prosthetic valve endocarditis often requires surgery it is possible to cure some infections using antibiotics alone. Finally this case shows that despite a relatively early presentation to hospital (on the same day as her first eye symptoms), and almost immediate treatment by specialist care, patients can still suffer serious side-effects – in this case loss of sight in her right eye.

Learning points

- ▶ Endocarditis is associated with high levels of both morbidity and mortality, and prosthetic endocarditis is becoming less rare and is associated with higher morbidity and mortality than non-prosthetic endocarditis.
- ▶ Endocarditis due to *S pneumoniae* is uncommon (1–3%), and is associated with high alcohol intake and possibly meningitis.
- ▶ Surgery in endocarditis is comparatively high risk, and combined with equivocal results from diagnostic investigations (in this case TOEs), this means decisions around whether to operate are taken with great care.
- ▶ Although many cases of endocarditis do require surgery, some may be cured with antibiotics alone.
- ▶ Endophthalmitis is part of the differential diagnosis of an acute red eye and should be actively excluded in those with a suspected concurrent bacteraemia.

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Competing interests None.

Patient consent Obtained.

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