CASE REPORT

Healthcare-associated infective endocarditis of the pulmonary valve

Marie Louise Laursen, Sabine Gill, Jacob Eifer Moller, Pia Hass Gustavsen

Department of Cardiology,
Odense University Hospital,
Odense C, Denmark

Correspondence to
Dr Sabine Gill,
sabine.gill@rsyd.dk

Accepted 29 January 2015

SUMMARY

We report a case of a 66-year-old man with known ischaemic heart disease, diabetes mellitus and stage 4 kidney disease who was admitted to our tertiary centre with shortness of breath and atrial flutter. Transoesophageal echocardiography (TOE) was without suspicion of endocarditis. During hospitalisation, the patient suffered a nosocomial infection in a peripheral vascular catheter caused by *Staphylococcus aureus*. TOE after positive blood cultures revealed a new vegetation on the pulmonary valve that resolved after antibiotic treatment.

BACKGROUND

Nosocomial healthcare associated infective endocarditis (IE) is most frequently seen in severely ill patients with central venous lines, and in patients on haemodialysis. The prevalence of nosocomial healthcare associated IE varies considerably in the current literature and is reported to be between 16% and 37% with the same high preponderance for left-sided heart valves as community acquired IE. IE involving the right heart valve accounts for 5–10% of patients with IE¹ in the majority of cases involving the tricuspid valve, whereas involvement of the pulmonic valve is rare and has not previously been reported as nosocomial healthcare associated IE without concomitant involvement of the tricuspid valve. Thus the present case highlights the importance of nosocomial healthcare associated IE in a rare case where only the pulmonic valve was involved.

CASE PRESENTATION

A 66-year-old man with ischaemic heart disease, type II diabetes mellitus and stage 4 kidney disease with estimated glomerular filtration rate of 34 mL/min, but no need for haemodialysis, was admitted to a tertiary centre due to increasing shortness of breath for 7 days. On the day of admittance, ECG showed atrial flutter and transthoracic echocardiography showed a severely depressed ejection fraction visually estimated at 15–20% during tachycardia. The heart valves were structurally normal with only a mild mitral regurgitation noted. C reactive protein (CRP) was 56 mg/L and leucocyte count $9.9 \times 10^9/L$. A peripheral venous catheter was inserted and subsequently transoesophageal echocardiography (TOE) was performed in order to exclude thrombi in left atrial appendage prior to cardioversion. TOE of good image quality confirmed a mild mitral valve insufficiency but showed otherwise structurally normal heart valves with no visible vegetations. Suspicion of left atrial

appendage thrombus was raised and the patient did not proceed to cardioversion. Two days after placement of venous catheter the patient developed clinical signs of phlebitis in the right upper extremity where the catheter was placed. The patient became febrile (39.3°C) over the next few days with increasing CRP, and subsequently 3 of 3 blood cultures revealed significant growth of *Staphylococcus aureus*. Cultures from the cannula before removal (on 2nd day after admission) also revealed growth of *S aureus* of the same strain as found in blood cultures. During the patient's hospital stay there was adequate glycaemic control.

INVESTIGATIONS

A positron emission tomography (PET) scan showed bilateral lung infiltrates. A new TOE performed showed more than 10 mm vegetation on the pulmonary valve (videos 1 and 2).

TREATMENT

The atrial arrhythmia was managed with rate control using digoxin, and furosemide was used for congestion. The *S aureus* IE was managed conservatively with a 6-week antibiotic regimen consisting of piperacillin/tazobactam at a dose of 4 g/500 mg every 8 h intravenously.

OUTCOME AND FOLLOW-UP

A PET scan showed resolution of the pulmonary infiltrates and a repeated TOE after termination of antibiotics showed that the vegetation on the pulmonary valve had disappeared. Treatment for heart failure with reduced ejection fraction was initiated and cautiously up-titrated during hospital stay. The patient was admitted at the hospital for a total of 2 months. The patient was seen in the outpatient clinic 1 month after discharge from hospital and

Video 1 Transoesophageal echocardiography of pulmonary valve in two-dimensional.

CrossMark

To cite: Laursen ML, Gill S, Moller JE, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-207577

Video 2 Transoesophageal echocardiography of pulmonary valve in three-dimensional.

showed no signs of infection, and due to rate control and heart failure therapy left ventricular ejection fraction had improved considerably.

DISCUSSION

Right-sided endocarditis is rare and most often affects the tricuspid valve. Isolated pulmonary valve endocarditis, however, is an even rarer entity, and is usually associated with intravenous drug abuse but can also be seen in patients with congenital heart diseases, alcohol abuse or on indwelling catheters.^{2–4} The male:female ratio of pulmonary valve IE is 3:1⁵ and the most common causative organism is *S aureus*.⁶ Our patient was not known to have any such risk factors. He had a structurally normal heart; however, he did have diabetes mellitus and stage 4 kidney disease, which renders a patient more susceptible to infections.⁷ Possibly this could explain the rapid course of *S aureus* infection of the peripheral catheter developing within days of admission.

Over the past decades, the profile of IE in industrialised countries has been changing significantly, with increasing prevalence of healthcare-associated IE reported being up to 37% of all IE.⁷ This is probably due to the increasing use of intracardiac devices (pacemakers, prosthetic heart valves, etc), more aggressive management of elderly fragile patients and increasing use of haemodialysis. The most common source of bacteraemia among patients with healthcare-associated IE is considered to be intravascular catheters, with rates of 40–50% in recent studies.^{8–9} The most frequent causative agent is *S aureus*, accounting for approximately 1/3 of cases. Furthermore, *S aureus* has been shown to be an independent risk factor for in-hospital death.^{7–10}

This case is, to the best of our knowledge, the first to document healthcare-associated infective endocarditis of the pulmonary valve in a patient with previously structurally normal heart valves and admission TOE with no signs of IE on the pulmonary valve, which was subsequently demonstrated. Further, there was a clear source of *S aureus* bacteraemia: an infected intravenous catheter.

The present case underscores the importance of considering healthcare-associated IE in case of hospital acquired infection in

intravenous catheters. Thus investigating all four heart valves by TOE should always be performed with minimal delay and repeated in case of *S aureus* bacteraemia, especially in case of poor control of infection and in patients with predisposing factors such as chronic kidney disease and diabetes mellitus.

Learning points

- ▶ A transoesophageal echocardiography (TOE) should be performed in case of *Staphylococcus aureus* bacteraemia.
- ▶ Repeated TOE is recommended in *S aureus* bacteraemia in case of poor control of infection and in patients with predisposing factors.
- ▶ When performing TOE for suspicion of infective endocarditis (IE), it is of outmost importance to investigate all four heart valves.
- ▶ It is important to consider healthcare-associated IE in patients with infected catheters.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Habib G, Hoen B, Tornos P, *et al*. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis (new version 2009): The task force on the prevention, diagnosis, and treatment of infective endocarditis of the European Society of Cardiology (ESC). Endorsed by the European Society of Clinical Microbiology and infectious diseases (ESCMID) and the International Society of Chemotherapy (ISC) for infection and cancer. *Eur Heart J* 2009;30:2369–413.
- 2 Abdelbar A, Azzam R, Yap KH, *et al*. Isolated pulmonary infective endocarditis with septic pulmonary embolism complicating a right ventricular outflow tract obstruction: scarce and devious presentation. *Case Rep Surg* 2013;2013:746589.
- 3 Park HE, Cho GY, Kim HK, *et al*. Pulmonary valve endocarditis with septic pulmonary thromboembolism in a patient with ventricular septal defect. *J Cardiovasc Ultrasound* 2009;17:138–40.
- 4 Tariq M, Smego RA Jr, Soofi A, *et al*. Pulmonic valve endocarditis. *South Med J* 2003;96:621–3.
- 5 Cassling RS, Rogler WC, McManus BM. Isolated pulmonic valve infective endocarditis: a diagnostically elusive entity. *Am Heart J* 1985;109:558–67.
- 6 Kourany WM, Miro JM, Moreno A, *et al*. Influence of diabetes mellitus on the clinical manifestations and prognosis of infective endocarditis: a report from the international collaboration on endocarditis-merged database. *Scand J Infect Dis* 2006;38:613–19.
- 7 Friedman ND, Kaye KS, Stout JE, *et al*. Health care—associated bloodstream infections in adults: a reason to change the accepted definition of community-acquired infections. *Ann Intern Med* 2002;137:791–7.
- 8 Murdoch DR, Corey GR, Hoen B, *et al*. Clinical presentation, etiology, and outcome of infective endocarditis in the 21st century: the international collaboration on Endocarditis-prospective Cohort Study. *Arch Intern Med* 2009;169:463–73.
- 9 Selton-Suty C, Celard M, Le Moing V, *et al*. Preeminence of staphylococcus aureus in infective endocarditis: a 1-year population-based survey. *Clin Infect Dis* 2012;54:1230–9.
- 10 Lomas JM, Martinez-Marcos FJ, Plata A, *et al*. Healthcare-associated infective endocarditis: an undesirable effect of healthcare universalization. *Clin Microbiol Infect* 2010;16:1683–90.

Copyright 2015 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow