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Think Twice, Look Twice: Eustachian Valve Endocarditis

Due to *Escherichia coli*.

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Case Report

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ABSTRACT

Eustachian valve endocarditis is a rare cause of infective endocarditis. We present the case of a 72-year-old lady in whom this was found after a lengthy search. We then go on to discuss the prevalence and some of the difficulties found in the investigation of this disease.

Introduction

Infective endocarditis (IE) is inflammation of the endocardium caused by infectious pathogens, most commonly bacterial. First characterised by the English physician William Osler in the 1885, it has been commonly divided into acute and sub-acute forms. It has an incidence in the US of around 2-4 cases per 100,000/year [1]. The development of IE usually begins with a bacteremia that allows the bacteria to reach and adhere to the surface of the heart valve. Because the valves do not receive any blood flow directly, it is difficult for the host defences (e.g. white blood cells) to eradicate the bacteria; therefore they are able to invade the valve leaflets.

Further subdivision of IE can be made by looking at the mechanism of infection, which often has different causative organisms; native valve IE often has a underlying cause of rheumatic heart disease or congenital heart disease. Prosthetic valves are also commonly affected. Finally, IV drug users and nosocomial IE have their own prevalent organisms.

IE most commonly affects the mitral valve, followed by the aortic, tricuspid and rarely pulmonary valves.

We describe the case of a patient with a much rarer site of infection.

Case Report

A 72-year-old female was admitted to our hospital with a one-week history of intermittent fever, rigors and loss of appetite. One month prior to this admission she had a brief hospitalization for investigation of abdominal pain. Her past medical history included a mechanical aortic valve replacement for calcific degenerative aortic stenosis, coronary artery bypass grafting due to chronic angina and autoimmune hypothyroidism.

On admission she was afebrile with a blood pressure of 93 / 50 mmHg and a pulse rate of 77 beats per minute. Clinical examination was otherwise unremarkable, without peripheral stigmata of infective endocarditis.

Laboratory tests revealed a normochromic, normocytic anaemia (haemoglobin 9.4 g/dL), hypoalbuminaemia (albumin 29 g/L), C-reactive protein 83 mg/L and INR 3.5. All other biochemical and haematological parameters were within normal range. Three sets of blood cultures were obtained on admission. *Escherichia coli* was later isolated in all three sets of blood culture. Transthoracic echocardiography (TTE) was arranged which revealed a well functioning and seated single-tilting aortic valve prosthesis without valvular regurgitation or echogenic masses. Given the TTE results, CT scan of the thorax, abdomen and pelvis was arranged which failed to show any focus of intra-thoracic or abdominal sepsis.

Because of high suspicion of prosthetic valve endocarditis, transoesophageal echocardiography (TOE) was then performed. This revealed only mild stenosis and moderate incompetence across the single tilting disc aortic valve prosthesis with no evidence of echogenic masses, paravalvular leak or objective valvular dysfunction.

However, echogenic masses with irregular margins were identified instead, surrounding the tip of the Eustachian valve (EV) (figure 1). Given the clinical and echocardiographic findings a diagnosis of EV infective endocarditis was made. Therapy with benzyl penicillin and gentamicin based on the sensitivities available was started. Following this, her clinical condition improved. Her temperature settled within 48 hours and after 6 days of intravenous antibiotics her inflammatory markers had normalised (C-reactive protein <10). Despite developing drug-related side effects (gentamicin-induced vestibular toxicity) the patient successfully completed the recommended 6-week course of antibiotics. A repeated TOE at the end of the treatment did not show any EV masses and again confirmed that the prosthetic aortic valve was functioning well. (figure 2).

Discussion

During development of the normal fetal cardiovascular system, the Eustachian valve (EV) - situated between the inferior vena cava and the right atrium - directs blood flow in the fetal circulation from the vena cava through the foramen ovale into the left atrium. After birth, the valve usually regresses and becomes functionless. Persistence of EV in adulthood is not uncommon and is usually encountered as an echocardiographic curiosity. It is most easily visualised on TOE, however it can also be seen on TTE.

Despite being vestigial, large Eustachian valves can potentially become infected especially in intravenous drug users or in those patients with intravascular prostheses (such as indwelling central venous catheters). Although, a putative target for infection isolated EV endocarditis is exceedingly rare with only a handful cases reported in medical literature. An incidence of 3.3% in patients with right-sided endocarditis has been reported [2].

Due to their 'well concealed' anatomical position Eustachian valve vegetations are not readily accessible with TTE and can only be reliably identified with semi-invasive cardiac tests such as TOE [2]. The need of semi-invasive tests along with considerable expertise to diagnose EV endocarditis could represent a limiting factor in estimating the true incidence of this infection. It is possible that EV endocarditis is perhaps far more common source of infection in patients with suspected infective endocarditis.

Aside from diagnostic difficulties, EV endocarditis is caused by the same microorganisms affecting native and non-native valvular tissues and responds very well to antibiotic therapy. The commonest causative organism is *Staphylococcus aureus*, being the pathogen in 53% of cases [3]. *E. coli* is more infrequent, reported in about 10% of cases.

Finally, in our case we were unable to identify the infection's portal of entry. This is the first case in the literature of an elderly patient with *Escherichia coli* EV endocarditis without any obvious risk factors for right-sided endocarditis. We could cautiously speculate a possible association between past hospitalization and an indwelling intravenous catheter although a urinary source of the infection cannot be excluded given the frequent association between *E. coli* endocarditis and urinary tract infections.

Our case demonstrates that diagnosis of infective endocarditis is challenging but in cases where there is a strong suspicion of infectious endocarditis all efforts and expertise should be utilised to identify the source of infection.

Figure Legends

1. **Transoesophageal echocardiography at index.**

Detailed explanation: Multiplane transoesophageal echocardiogram at 90 degrees (modified bi-caval view) showing a large and prominent Eustachian valve (EV) situated near right atrium (RA). The tip of the EV is abnormal with irregularly dense and echogenic appearance. There is an independent filamentous mass (VE) attached to the tip of EV, consistent with vegetation. Transoesophageal echocardiography showing the vegetation (VE) on the Eustachian valve (EV). LA = left atrium; Ao = aorta.

2. **Repeat transoesophageal echocardiography following 6 weeks of antibiotics.**

Detailed explanation: Multiplane transoesophageal echocardiogram in the same view as figure 1 after 6 weeks of antibiotic therapy. The large and prominent Eustachian valve (EV) now appears free of echogenic masses.

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