INFECTIVE ENDOCARDITIS: AT THE CROSSROADS BETWEEN INFECTIOUS DISEASES AND CARDIOLOGY

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ABSTRACT
Endocarditis *is inflammation of the inner layer of the heart, the endocardium. It usually involves the heart valves. Other structures that may be involved include the interventricular septum, the chordae tendineae, the mural endocardium or the surfaces of intracardiac devices. Infective endocarditis is a form of endocarditis caused by infectious agents, which are usually bacterial (other organisms can also be responsible). Before the age of modern antibiotics it was almost universally fatal. Although the epidemiology of infective endocarditis has changed over the last 50 years, with rheumatic heart disease becoming less common and degenerative valve disease more frequent, its incidence and associated mortality have remained relatively constant.*

Keywords: *Infective endocarditis, cardiology, infectious diseases, heart valves*

CASE REPORT

A 28-year-old woman presented to the emergency unit with a 3-week history of fever, shortness of breath, cough (productive of whitish, frothy sputum) and bilateral leg swelling. There was associated history of orthopnoea, paroxysmal nocturnal dyspnoea, easy fatigability and palpitations. On examination, she was acutely ill-looking, febrile (37.5^{o}C) and had bilateral pitting pedal oedema up to her ankles. She also had grade 4 finger clubbing. Her pulse rate was 104 beats per minute and blood pressure was 90/60 mmHg. Her praecordium was hyperactive with her apex located at the 6th left intercostal space, anterior axillary line. Her jugular venous pressure was raised and heart sounds were 1st, 2nd and 3rd with grade 3/6 mitral regurgitation and tricuspid regurgitation murmurs. Her liver and spleen were palpable 8 cm and 2 cm below the right and left costal margins respectively. She had ascites demonstrable by a fluid thrill. She was dyspnoeic with a respiratory rate of 40 cycles per minute. She also had bibasal crepitations.

Echocardiography done showed moderate-to-severe anterior mitral valve leaflet (AMVL) and posterior mitral valve leaflet (PMVL) sclerosis with the PMVL tethered to the posterior wall. Severe eccentric mitral regurgitation (MR) was also observed. Moderate-to-coarse vegetations were seen on the AMVL and PMVL, being flung with evidence of imminent dislodgement. Ongoing moderate tachycardia was also observed. Electrocardiography done showed sinus tachycardia with low voltages in chest leads. Samples taken for blood cultures returned negative (patient had already received antibiotics prior to presentation). An assessment of biventricular heart failure and infective endocarditis with background rheumatic valvular heart disease (severe MR) was made. She was placed on diuretics, digoxin and also received a course of intravenous antibiotics. Her clinical status improved significantly while on admission and a repeat echocardiography done showed a marked reduction in the size of the vegetations on the mitral valve. She was subsequently discharged and is currently on follow-up at the Cardiology Clinic.

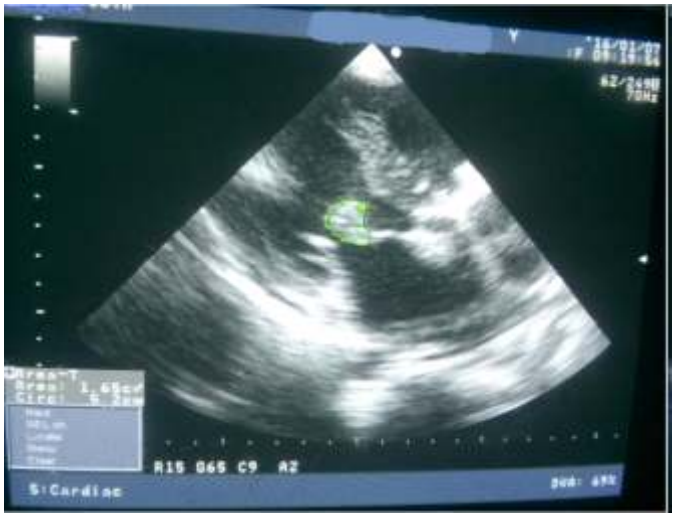

Figure 1: Two-dimensional echocardiography (parasternal long axis view) showing sclerosis of the anterior and posterior mitral valve leaflets with the posterior mitral valve leaflet tethered to the posterior wall. Moderate-to-coarse vegetations (outlined) observed on the anterior mitral valve leaflet.

DISCUSSION

Infective endocarditis (IE) is defined as an infection of the endocardial surface of the heart which may include one or more heart valves, the mural endocardium or a septal defect. Its intracardiac effects include severe valvular insufficiency, which may lead to intractable congestive heart failure and myocardial abscesses. If left untreated, IE is generally fatal. Before the pandemic of human immunodeficiency virus (HIV) infection, IE was the syndrome for which the expertise of infectious diseases physicians was almost universally requested. IE has the proclivity to cause complications both at the cardiac valve site and at extracardiac locations that can predispose affected patients to serious morbidity and mortality.

The global burden of disease due to IE is largely unknown. Much of the world's population lives in developing countries, where many people do not have routine access to advanced medical care. In addition, in most of these countries, no infrastructure exists on either a local or countrywide level for disease reporting. In a study published in 1976 by Falase et al., 90 cases of IE were seen over a 10-year-period at the University College Hospital, Ibadan. Peak incidence was reported to be in the third decade and rheumatic heart disease was the commonest pre-existing lesion in 59 cases with subacute endocarditis. In most cases, the source of infection was not known. In 41 of the 90 cases (44%), the diagnosis was made only at autopsy. The bacterial isolation rate was low, the commonest organisms being staphylococci, streptococci, micrococci and gram-negative bacilli. The overall mortality was 70%.

In developed countries, the epidemiology of IE has changed over the last 50 years, with rheumatic heart disease becoming less common and degenerative valve disease more frequent. Annual incidence is 4 - 10 per 100 000 population and it is slightly more common in men. Nearly 75% of cases occur in the 2nd, 3rd and 4th decades of life with peak incidence in the 3rd decade. The mortality of IE was 100% before the advent of antibiotics. In developed countries it is now reduced to around 30%. Autopsy incidence of IE (over 50 years) has been reviewed in a study published in 1978 by Mehta et al. 185 cases were recorded in a total of 39,931 autopsies giving an average incidence of 0.46%.

Contributing factors to the incidence of IE include increased prevalence of degenerative heart disease and increased use of invasive medical procedures. The majority of cases occur in those with predisposing identifiable cardiac structural abnormalities (congenital or acquired) or those with recognized risk factors of the disease, such as injection drug use (IDU), indwelling catheters, poor dental hygiene or infection with HIV. For IDUs, the estimated risk is 2 - 5% per year. It is generally on the right side of the heart and the tricuspid valve is affected in the vast majority of cases. Prosthetic valve IE (PVE) occurs in 3 - 6% of prosthetic valve recipients. The risk is highest in the first 6 months and then declines to 0.2 – 0.4% per year.

The mitral valve is the commonest site of predilection (as seen in the index case) irrespective of the aetiologic agent. The aortic valve is also commonly involved. Tricuspid valve involvement is rare but has been on the increase in recent years. It is however particularly common in drug addicts (IDUs). The commonest symptom of IE is fever (usually more than 38°C). This is seen in about 80 – 95% of patients. It may however be absent in elderly patients, patients on antibiotics or antipyretics, those with congestive cardiac failure or renal failure. Other features are: chills (40%), weakness (40%), dyspnoea (40%), anorexia (25%), cough (25%), malaise (25%), skin lesions (20%), nausea/vomiting

(10 – 20%), headache (20%), stroke (10 – 20%), chest pain (5 – 15%), abdominal pain (5 – 15%) and back pain (5 – 10%). The commonest signs are heart murmurs (85%), petechiae (20 – 40%), splenomegaly (20 – 57%) and embolic phenomena (>50%). A change in mental status may occur in 10 – 15% of patients. This may be due to embolic stroke.
The main modalities of diagnosis of IE are blood cultures and echocardiography. The most popular diagnostic criteria used are the modified Duke criteria. Generally speaking, the diagnosis of IE based on these criteria are: (a) pathologic criteria (microorganisms demonstrated by culture or histology from lesions) and (b) clinical criteria (presence of two major criteria; one major and three minor criteria or five minor criteria). The treatment goals for IE are eradication of the microorganism responsible and resolution of any intra- and extracardiac infectious complications. The first is usually achieved with prompt intravenous antibiotic therapy directed at the causative agent, while the second often requires surgical intervention.

On suspicion of IE, patient should be started empirically on antibiotics. In a patient with an uncomplicated history, a popular regime is ceftriaxone with gentamicin. *Definitive antibiotic treatment* should be based on culture and sensitivity results. In general, antibiotics need to be continued for 4 to 6 weeks. The antibiotic therapeutic regime chosen depends on the type of valve involved (native or prosthetic), time between prosthetic valve implantation and infection (more or less than a year) and the aetiological agent, when identified. Around half of cases of IE are treated surgically due to serious complications. While this option should be considered in the active phase of the disease to prevent progression of heart failure, irreversible structural damage and systemic embolism, this phase is also associated with higher operative risk.

Current indications for surgical treatment are: (1) refractory heart failure directly related to valve dysfunction; (2) uncontrolled infection; and (3) prevention of embolic phenomena. The risk of embolism is high (20 - 50%) in patients with IE, although it decreases rapidly following institution of directed antibiotic therapy, particularly after two weeks. There is a small role for extracardiac surgery in the treatment of neurological complications which may happen occasionally (e.g. ruptured mycotic aneurysm). The overall in-hospital mortality rate of IE is approximately 45%. The protean nature of IE, the latency of the associated cardiac symptoms and its close simulation of other disorders combine to render the detection of IE peculiarly difficult. A very high index of suspicion is therefore essential because this disease, if left untreated, is always fatal.

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