

Chapter 10

Advances in the Diagnosis and Treatment of Infective Endocarditis

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ABSTRACT

Infective endocarditis is a relatively uncommon infectious disease that leads to substantial mortality and morbidity. This disease primarily involves bacterial infection of the heart valves. Diagnosis is contingent upon excellent physical examination and radiological and microbiological evidence. While failure to identify the causative microorganism does not preclude the diagnosis of infective endocarditis, management is more difficult. Recent advances have improved the etiological identification and allowed for shorter time to optimal antibiotic therapy. Advances in treatment have focused on therapies to combat drug-resistant microorganisms as well as mitigate adverse events. While new therapies are available, there exists a paucity of clinical evidence and further studies are required.

INTRODUCTION

While cardiovascular infections are relatively uncommon, they carry substantial morbidity and mortality and consume substantial healthcare resources. Three distinct clinical syndromes have been previously described and account for the vast majority of serious infections of the heart: endocarditis, myocarditis, and pericarditis. A variety of infectious pathogens including viruses, bacteria, and fungi are responsible for these syndromes. Rapid diagnosis, identification of etiologic pathogen, and receipt of optimal therapy are necessary to reduce mortality and prevent substantial morbidity.

Infective endocarditis refers to infection of the inner lining of the heart, specifically the valves of the heart. Now considered the fourth most common serious infection leading to mortality, infective endo-

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carditis has an incidence of only 3-7 cases per 100,000 person-years (Baddour, 2015; Mylonakis, 2001). However, it has been estimated to be responsible for a loss of 1.6 million healthy years globally (Murray, 2012). In this chapter, we explore the epidemiology, pathophysiology, etiology, and diagnosis, with a particular emphasis on treatment advances for the most common infectious pathogens. The objectives of this chapter are to give the reader a comprehensive overview of this disease and an in depth discussion on treatment by discussing evidence-based recommendations and controversies.

EPIDEMIOLOGY AND PATHOPHYSIOLOGY

Two major guidelines have been published regarding the diagnosis and treatment of infective endocarditis; the United States (US) guideline was recently updated in 2015 (Baddour, 2015) as was the European Society of Cardiology guidelines (Habib, 2015). While infection of any part of the inner lining heart would be included in this syndrome, the heart valves have a higher probability of becoming infected (Fowler, 2015).

During the 20th century, the median age of patients with infective endocarditis has gradually increased from less than 30 years to the current estimated median of 50 years of age (Fowler, 2015; Murdoch, 2009). Of note, males more commonly become infected, particularly later in life. This has not always been the case but may be due to a number of factors including the decline in rheumatic fever, the aging population, and immunosenescence (Fowler, 2015).

Of alarming concern is the advent of healthcare-associated infective endocarditis. This new classification is likely due to increased incidence of surgical interventions, insertion of prosthetic material, and duration of indwelling catheters. This increase easily prompts anxiety in light of the rise of widespread antibiotic resistance and the proliferation of pandrug-resistant microorganisms (Spellberg, 2008; Spellberg 2013).

A vast majority of infective endocarditis is localized to either the aortic or mitral valve (left-sided endocarditis). Infection on the tricuspid and pulmonary valves (right-sided endocarditis) occurs infrequently. Of interest, the incidence of aortic valve endocarditis with involvement of other valves has increased substantially from 5% of cases in 1938 to 38% in the year 2000 (Murdoch, 2009). Right sided endocarditis is estimated to account for only 10% of all cases (Moss, 2003). The hypotheses for this difference in location of infection are three-fold: 1). blood on the left-side of the heart has a higher oxygen content which is more conducive to bacterial growth; 2). higher pressures on the left side of the heart may create higher turbulence which leads to higher probability of endothelial damage; 3). congenital and acquired abnormalities of heart structures are more common on the left side (Frontera, 2000). Rheumatic heart disease, once the most common cause of defect leading to infective endocarditis, has reduced in incidence in developed countries to less than 5% of infective endocarditis cases (Murdoch, 2009). Major congenital heart defects are known to predispose to infective endocarditis; however, minor defects are also major risk factors. One of the most common of these defects is a bicuspid aortic valve which was shown in one study to be a contributing factor in 16% of native valve endocarditis cases (Tribouilloy, 2010). This defect is particularly prevalent in elderly males with most patients unaware of the defect until the time of infective endocarditis diagnosis (Lamas, 2000). Other defects include degenerative lesions present in the elderly (Fowler, 2015).

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