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An overview of risk factors & different micro-organisms causing infective endocarditis

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Abstract

Infective endocarditis (IE) confers to an infection of the endocardial surface of the heart. It mostly involves heart valves, but it can affect the endocardium or intracardiac devices. There are several different classifications of infective endocarditis, based on the clinical presentation, depending upon the type of valve (native or prosthetic) involved and the causative micro-organisms associated, etc. It has a wide range of manifestations & complications. Hence, early diagnosis & treatment can reduce the mortality & morbidity to a large extent. The two primary objectives of this activity are to focus on the risk factors involved & the different micro-organisms associated in the causation of infective endocarditis.

Keywords: Infective endocarditis, causative micro-organisms, risk factors, antimicrobial resistance

Introduction

Infective endocarditis (IE) confers to an infection of the endocardial surface of the heart. It mostly involves heart valves, but it can affect the endocardium or intracardiac devices. It may be classified as acute, subacute, or chronic, depending on the time course of the infection^[1]. It's now classified, according to the type of valve (Native or prosthetic) and the causative micro-organisms associated (e.g. staphylococcal, streptococcal, enterococcal, fungal, culture negative, etc.). Treatment includes several weeks of antibiotics or other medicines and sometimes surgery. With quick, aggressive treatment, many people survive. Without treatment, endocarditis can be fatal^[2].

Risk factors

There are several risk factors associated with infective endocarditis either single or multiple which include age more than 60 years, male gender, IDUs (Injection drug users), previous history of infective endocarditis, poor dentition or dental procedure, presence of a prosthetic valve or intracardiac device, history of valvular heart disease (rheumatic heart disease, mitral valve prolapse, aortic valve disease, mitral regurgitation, etc), congenital heart disease (aortic stenosis, bicuspid aortic valve, pulmonary stenosis, ventricular septal defect (VSD), patent ductus arteriosus (PDA), coarctation of aorta & tetralogy of Fallot), indwelling intravenous catheter, immunosuppression and hemodialysis patients.

Factors contributing to infective endocarditis include antimicrobial resistance, increasing implantation of intravascular devices, COVID-19, opiate use disorders and growing number of immunosuppressed patients^[3].

Several things increase the chance of getting bacterial endocarditis include heart transplant with a leaky heart valve and weak immune system^[4].

Causative micro-organisms

Approximately 80% of cases of native valve endocarditis are due to streptococci (viridans group, *Streptococcus gallolyticus*) or staphylococci. The commonest isolate in injecting drug users (IDUs) and tricuspid valve infective endocarditis is *Staphylococcus aureus*. MRSA (Methicillin-resistant *Staphylococcus aureus*) may cause systemic infections such as endocarditis^[5].

Staphylococcus epidermidis (Coagulase-negative *Staphylococcus aureus* - CoNS) is the commonest isolate in early (Less than 2 months) prosthetic valve endocarditis (PVE). *Corynebacterium pseudodiphtheriticum* shows predilection for prosthetic valves. *Corynebacterium striatum*, *Corynebacterium jeikeium* and *Arcanobacterium haemolyticum* are associated with native infective endocarditis of nosocomial origin. Enterococcal (*Enterococcus faecalis* & *Enterococcus faecium*) endocarditis is usually associated with malignancy or manipulation of the genitourinary or gastrointestinal tracts. Gram-positive cocci like *Abiotrophia* species, *Granulicatella* species and *Lactococcus* species rarely cause infective endocarditis. *Facklamia hominis* (*Facklamia* species resemble “viridans” streptococci on culture & Gram positive facultatively anaerobic, cocci) is a very rare causative organism of infective endocarditis [6]. Other micro-organisms, e.g. *Listeria*, *Bacillus*, *Salmonella*, *Escherichia coli*, *Enterobacter*, *Citrobacter*, and *Pseudomonas* species are uncommon. HACEK Group of organisms (*Haemophilus*, *Aggregatibacter*, *Cardiobacterium*, *Eikenella*, and *Kingella*) are Gram-negative fastidious organisms & are usually associated with large vegetations. Fungi (*Candida* species & *Aspergillus* species) are also associated with large vegetations. About 14% of patients may have negative blood cultures due to previous antibiotics therapy or due to fastidious organisms such as *Coxiella*, *Legionella*, *Bartonella*, *Mycoplasma*, *Brucella*, *Chlamydia*, *Tropheryma whipplei* and fungi [1, 7]. Polymicrobial infections occur in approximately 1–2%. Disseminated *Neisseria gonorrhoeae* infections can result in endocarditis [8, 9, 10]. Gram-negative bacilli for example *Pasteurella* species & *Capnocytophaga* species are also included in rare cause [1].

Conclusion

The clinical diagnosis and management of infective endocarditis is an extremely complex process & it mandates the sincere involvement of multi-disciplinary team (MDP) to accomplish best patient care that includes cardiologist, cardiothoracic surgery, internist, infectious diseases physician/Clinical Microbiologist, nurse practitioner, laboratory practitioner & a primary care provider. Appropriate patient counseling is vital for injecting drug users (IDUs) with infective endocarditis secondary to intravenous drug use & should be referred to de-addiction centers. To summarize, comprehensive knowledge of the risk factors involved & the associated micro-organisms helps in early diagnosis and evidence based guideline-directed management can facilitate to limit the morbidity and mortality of infective endocarditis in a large scale.

Conflict of interest

All authors report no conflicts of interest relevant to this article.

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