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REVIEW ARTICLE

INFECTIVE ENDOCARDITIS

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DEFINITION

Infective endocarditis (IE) is a disease in which the infecting organism invades the endothelial lining of the heart and great vessels.[1]

Historically IE has been classified as acute or sub-acute on the basis of clinical course in the pre-antibiotic era. Acute endocarditis denotes infection on a normal valve by a highly virulent organism causing rapid destruction of the heart valves and widespread metastatic foci. Death usually occurred within six weeks. Subacute endocarditis referred to infection on an abnormal valve (usually rheumatic) with relatively avirulent organism. The course was indolent i.e. upto two years.

Currently rheumatic heart disease is becoming infrequent, especially in western countries, a newer classification has been adopted.

1. Native Valve Endocarditis (NVE).
2. Prosthetic Valve Endocarditis (PVE).
3. I/V drug abuser endocarditis.

PREDISPOSING FACTORS

Incidence of IE in infancy and childhood is low. It is becoming more frequent in older patients.[2] Rheumatic heart disease was the predominant underlying factor for lesions in patients with IE in the past, which now accounts for only 25-30% of predisposing cardiac lesion.[3] Unfortunately, rheumatic heart disease is still common in developing countries and predisposes to IE. Mitral valve prolapse has emerged as a frequent underlying lesion of IE.[4] Congenital heart disease accounts for 10-20% of predisposing lesion.[4] IE is an important but uncommon complication of pregnancy.[5] I/V drug base is also a significant risk for developing IE.[6] Prosthetic valve endocarditis is reported to occur in 1-4% of all patients with prosthetic heart valve.[7] Central venous and pulmonary artery catheters also increase the risk of IE.

PATHOGENESIS

Normal endothelium is non-thromogenic and poorly receptive to attachment by most bacteria.

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Damage to endothelial surface of the heart and of blood vessels leads to deposition of platelets and fibrin forming a non-bacterial thrombotic endocardial (NBTE) lesion. Such lesions are believed to provide a more receptive surface for bacterial colonisation during episodes of bacteremia.[9] Infective vegetation are typically located on atrial surface of the atrio ventricular valves and ventricular surface of semilunar valves.[10]

PATHOPHYSIOLOGY

The signs and symptoms of IE are highly variable and depend on the organ system involved. Clinical feature result from:

1. Local intracardiac infectious process and its complication i.e. valve destruction, valve ring abscess, valve perforation, heart block and pericarditis.
2. Constant bacteremia results in constitutional symptoms and signs e.g. fever, fatigue, anorexia, splenomegaly and metastatic infections.[11]
3. Bland or septic embolization of fragments of vegetation to virtually any organ.
4. Immune complex associated disease e.g. glomerulonephritis, arthritis.

MICROBIOLOGY

IE can be caused by a wide variety of microorganisms. The majority of cases of NVE are caused by strep viridan (60%) staph aureus (20-25%) and enterococci (10%), gram negative, bacilli and fungi are uncommon causes of IE. [12] In I/V drug abuser's S Aureus is the most common infecting microorganism. In early PVE the infecting organisms are staph epidermidis, Sanreus, gram negative bacilli and fungi in decreasing order. In late PVE (> 2months) the infecting organisms are the same as NVE.[7]

CLINICIAL MANIFESTATIONS

The clinical syndrome of IE should be suspected in any patient, with unexplained fever and multisystem disease. The diagnosis is substantiated by positive blood culture, and classic findings on echocardiography.

FEVER

Fever is present in almost all patients with IE. It may be absent in patients with history of antibiotic use, severe heart failure, renal failure, elderly and debilitated.

HEART MURMUR

Murmur is the most common complication of IE resulting from valve destruction, myocarditis, cardiac abscess and coronary emboli. Ring abscesses can produce heart block. [13]

SKIN MANIFESTATIONS

These include petechiae, splinter hemorrhages, janeway lesions and clubbing. None of these are pathognomonic of IE and can be seen in other diseases.[14]

EYE SIGNS

Roth spots (oval retinal hemorrhages with pale centre) are seen in less than 5% of cases and may also be seen in Rheumatological and connective tissue disorder.

NEUROLOGICAL MANIFESTATION

Neurological manifestation can be due to cerebral embolism, intracranial hemorrhage, mycotic aneurysm, brain abscess. These may present with sign and symptoms, of headache, seizures, stroke etc.

ABDOMINAL SIGNS

Splenomegaly was a frequent finding in preantibiotic era, but is less common now.

RENAL MANIFESTATIONS

Glomerulonephritis may result from immune complex deposition causing microscopic hematuria, proteinuria etc. Emboli to renal artery may result in infarction of kidney causing flank pain, hematuria and hypertension.

DIAGNOSIS

Infective endocarditis, is generally suspected on clinical grounds and diagnosis is confirmed by isolation of infecting agent from blood cultures and identification of typical lesion on echocardiography.[15]

BLOOD CULTURE

At least 3 blood cultures samples may be taken from different sites at an interval of one hour. If the patient has recently taken antibiotics, blood cultures can be delayed for 48 hours after stopping antibiotics except in acute endocarditis where any delay in initiation of treatment would be extremely harmful.

ECHOCARDIOGRAPHY

It may detect predisposing cardiac lesions e.g. rheumatic heart disease, prosthetic valvular disease, VSD, mitral valve prolapses, congenital heart disease etc. Vegetations were first reported in patients with IE in 1973 by Dillon and associates[16] and defined as mass of abnormal echoes attached to endocardial surface. In a patient with clinical suspicion of IE, demonstration of vegetation, perforation or abscess[17] may be highly diagnostic. Transthoracic echocardiography may be able to demonstrate vegetation of >5 mm size in 60-80% cases of IE.[18] Transesophageal echocardiography is even more sensitive and can demonstrate vegetation of upto 2 mm size in 90- 95% cases of IE. [19] Echocardiography lacks specificity in that thickened valves, non-infected thrombi, [20] nodules, tumors [21] and flail leaflets can be misinterpreted as vegetation.

OTHER LAB TESTS

There is normocytic anemaia, TLC is normal or low except in acute IE, ESR is almost always raised, urinalysis may reveal proteinuria and microscopic hematuria. Rheumatoid factor is positive in 50% cases of IE.

TREATMENT

Before the availability of antibiotics IE was an almost uniformally fatal disease. Antibiotic therapy and cardiac surgery in selected patients have completely changed the outlook and prognosis of patients with IE. Generally antibiotic treatment can be started empirically after drawing 3 blood cultures in any patient with suspected IE. If the patient has taken antibiotics in the past two weeks, the treatment can be delayed to ensure isolation of infecting agent. If acute endocarditis is suspected therapy should not be delayed as any delay can result in further valve destruction and abscess formation.

PRINCIPLES

Cure of IE requires sterilization of vegetation and inadequate therapy may result in relapse. Parenteral bactericidal agent in high concentration should be used for at least two weeks to a maximum of six weeks depending upon infecting agent, valve affected and the clinical response.

THERAPY BEFORE ISOLATION OF ORGANISM

In case of acute onset or I/V drug abuse therapy is directed against S aureus[22] and in the presence of heart prosthesis, against S epidermidis and S aureus and gram neg. baccili[23] with a subacute presentation therapy should be directed against gram positive cocci.[22]

SURGICAL MANAGEMENT

Surgical therapy may be considered when medical therapy has failed or serious complications have developed which need immediate surgical intervention.

Valve replacement is not without its problems (e.g. PVE, valve degeneration, emboli, bleeding from anticoagulation) and should be carried out only when definite indications exist[24] The major indications are refractory heart failure, myocardial or valve ring abscess, uncontrolled infection, prosthetic valve

dehiscence or dysfunction recurrent systemic emboli etc.[25,26]

ANTI-COAGULATION

Anti-coagulation has no value in the treatment of IE as it neither prevents embolization nor does it inhibit the growth of vegetation, instead it increases the risk of bleeding from the mycotic aneurysm. However, anti-coagulation is definitely required when there is a prosthetic valve and also for recurrent pulmonary emboli from non-cardiac sources.[27]

PROPHYLAXIS

Despite universal acceptance that, before procedures known to produce bacteremia, antibiotics should be given to patients who are at risk with cardiovascular lesions, the value of antibiotic prophylaxis remains controversial.[28] However, there are good reasons to believe that prophylaxis is effective in high risk patients undergoing a procedure which is likely to cause bacteremia.[29] Moreover prophylaxis is much cheaper than the cost of treating endocarditis.

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