INFECTIVE ENDOCARDITIS: A SURGICAL PERSPECTIVE

With an average incidence of 3.6/100,000 population, infective endocarditis (IE) is not an uncommon entity with which cardiac surgeons have to deal with. Infective endocarditis includes conditions in which structures of heart, mostly valves harbour an infective process leading to valvular dysfunction, sepsis or embolism. The terms acute (virulent organism, life threatening within days) and subacute (weeks to several months) are not much of surgical relevance. The surgical terms which determine our surgical approach are Active Endocarditis, Healed Endocarditis and Prosthetic valve endocarditis. Active Endocarditis indicates an operation carried out in the presence of obvious cardiac infection, or has been treated within 2 weeks of surgery. Healed endocarditis indicates an operation carried in absence of obvious local infection, following treatment and supposed eradication of microorganisms. Staphylococcus predominates all hospital acquired, prosthetic valve and drug related IEs and Streptococcus is the organism in majority of native valve endocarditis.

Duke’s diagnostic criteria has been used traditionally to diagnose IE, which has major and minor criteria. 

**MAJOR CRITERIA**

1. Positive Blood Culture for IE (from two separate blood cultures)
2. Evidence of endocardial involvement: Positive Echocardiogram for IE: Oscillating intracardiac mass, Abscess, New partial dehiscence of prosthetic valve, new valvular regurgitation

**MINOR CRITERIA**

1. Predisposing heart condition / IV drug use
2. Fever $\geq$ 38°C
3. Vascular phenomena
4. Immunologic phenomena
5. Microbiologic Evidence: positive blood culture not meeting major criterion, serologic evidence of active infection
6. Echocardiographic features not meeting major criterion

Indications for surgical intervention in IE is follows:

**ACTIVE ENDOCARDITIS**

1. Presence of moderate/severe heart failure
2. Major embolic episodes
3. Important arrhythmias/ progressive heart blocks
4. Progressive renal failure
5. Staphylococcal endocarditis
6. Fungal endocarditis
7. Uncontrolled sepsis

**EARLY Prosthetic Valve Endocarditis (<2 months after initial surgery)**

1. Mild heart failure with evidence of valvular obstruction due to vegetations
2. Regurgitant murmur
3. Staphylococcal infection with any degree of heart failure

**LATE Prosthetic Valve Endocarditis**

Indications are same as that of Native Valve Endocarditis

The timing of operation for IE should be based on clinical consideration and not on duration of antibiotic treatment.

Echocardiographic features which warrants the need for surgery are:

**VEGETATION**
1. Persistent vegetation after embolisation
2. Vegetation ≥ 10mm
3. Increase in vegetation size after 4 weeks of antibiotics

**VALVULAR DYSFUNCTION**
1. Acute MR/ AR with ventricular dilatation
2. Valve perforation/ Rupture

**PERIVALVULAR EXTENSION**
1. Valvular dehiscence
2. Large abscess/ Fistula
3. Extension of abscess despite antibiotic

The goals of surgical therapy in the setting of IE are removal of infected tissue, drainage of abscesses, restoration of atrio-ventricular or ventriculo-arterial continunity reversal of hemodynamic abnormality and closing of acquired defects (VSD, Ring abscess, fistula, aneurysms).

During surgery, thorough excision of infected tissue and drainage of abscesses is paramount importance. In PVE, valve has to be explanted always. Pericardial patches are useful to close defects and buttress suture lines. The choice of prosthesis still remains controversial in the setting of active IE. The advantage of tissue valves over mechanical prostheses has not been conclusively demonstrated. Homografts definitely have less re-infection in addition to advantage of flexibility in restoring ventriculo-aortic continuity.

Post operatively, these patients require vasopressor support, IV antibiotics for 4-6 weeks as well as liberal diuretic therapy.

In spite of advances in surgery and intensive care the results of surgical therapy for IE still remains suboptimal due to the nature of the disease. The early (hospital) mortality in Native Valve Endocarditis varies from 4% to 30% and PVE varies from 20% to 40%. Studies evaluating late survival after surgery for IE shows an overall 15 year survival of 44% (59% NVE, 25% PVE).

The independent predictors of death are advanced age, shock, PVE, LVEF <40%, recurrent endocarditis and renal dysfunction.

To conclude, the best surgical strategy to treat this challenging subset of patients is early intervention in severe disease and in PVE, thorough surgical debridement and to operate before the onset of the above mentioned predictors of poor survival.

**REFERENCES**

1. Prendargast et al, Heart 2006;92:879
2. Kirklin’s Cardiac Surg (3rd ed), pp 689-7
4. Kirklin’s Cardiac Surg (3rd ed), pp 689-711
8. Tirone D et al. JTCVS 2007;1333:144