INFECTIVE ENDOCARDITIS

Introduction

An uncommon condition in children but has a high morbidity and mortality if untreated.

Underlying risk factors include:
- congenital heart disease
- repaired congenital heart defects
- congenital or acquired valvular heart diseases
- immunocompromised patients with indwelling central catheters

Common symptoms are unexplained remitting fever > 1 week, loss of weight, loss of appetite and myalgia.

Table 1. Modified Duke Criteria for the Diagnosis of Infective Endocarditis

Major Criteria	Minor Criteria
• blood culture positive: typical microorganisms from two separate blood cultures: Viridans streptococci, Streptococcus bovis, HACEK group,[1] Staphylococcus aureus community-acquired enterococci • evidence of endocardial involvement on echocardiogram *1. fastidious gram negative bacteria from Haemophilus spp, Actinobacillus actinomycetemcomitans, Cardiobacterium hominis, Eikenella corrodens and Kingella kingae*	• predisposing heart condition, prior heart surgery, indwelling catheter • fever, temperature > 38°C • vascular phenomena: - major arterial emboli - septic pulmonary infarcts - mycotic aneurysm - intracranial hemorrhage, - conjunctival hemorrhages - Janeway's lesions • immunologic phenomena: - glomerulonephritis - Osler's nodes - Roth's spots - rheumatoid factor • microbiological evidence: positive blood culture not meeting major criterion

Table 2. Definition of Infective Endocarditis According to the Modified Duke Criteria

definite IE	possible IE	rejected IE
• pathological criteria 1. microorganisms by - culture - histological examination of vegetation or intracardiac abscess specimen 2. pathological lesions with active endocarditis • clinical criteria: 2 major or 1 major + 3 minor or 5 minor	- 1 major + 1 minor criteria - 3 minor	• firm alternative diagnosis • resolution of symptoms with antibiotic therapy < 4 days • no pathological evidence of IE at surgery or autopsy • not meet criteria for possible IE

IE, Infective Endocarditis

Investigations

- blood culture
- C- Reactive protein/ESR
- full blood count
- urine FEME
- Chest X-ray
- echocardiography

Management

- ensure 3 blood cultures taken before antibiotic therapy.
  Do not wait for echocardiography.
- use empirical antibiotics, until culture results available (refer Table 3) .

Table 3: Antibiotic choices for Infective endocarditis in Children (Adapted from Malaysian CPG on antibiotic usage)

Indication	preferred regime	alternative regime
Empirical Therapy For Infective Endocarditis	IV Penicillin G 200 000 U/kg per day in 4–6 divided doses x 4 weeks AND IV/IM Gentamicin 3 mg/kg per day in 3 divided doses x 2 weeks	IV Vancomycin 30 mg/kg per day in 2 divided doses x 4–6 weeks AND IV/IM Gentamicin 3 mg/kg per day in 3 divided doses x 2 weeks
Streptococcus viridans endocarditis	IV Vancomycin 30 mg/kg per day in 2 divided doses x 4–6 weeks AND IV/IM Gentamicin 3 mg/kg per day in 3 divided doses x 2 weeks	IV Vancomycin 30 mg/kg per day in 2 divided doses x 4–6 weeks AND IV/IM Gentamicin 3 mg/kg per day in 3 divided doses x 2 weeks
Enterococcus endocarditis	IV Penicillin G 300 000 U/kg/day in 4–6 divided doses x 4 - 6weeks AND IV Gentamicin 3 mg/kg/day in 3 divided doses x 4 - 6 weeks	
Methicillin sensitive *Staphylococcus* endocarditis	IV Cloxacillin 200mg/kg/day in 4-6 divided doses x 6 weeks *+/-* IV/IM Gentamicin 3mg/kg/day in 3 divided doses x 3 - 5 days	
Penicillin allergy	IV Cefazolin 100mg/kg/day in 3 divided doses x 6 weeks	IV Vancomycin 40 mg/kg /day in 2 - 3 divided doses x 4-6 weeks
Methicillin Resistance	IV Vancomycin 40 mg/kg/day in 2 - 4 divided doses x 6 weeks	
Culture- Negative Endocarditis	IV Ampicillin-sulbactam 300mg/kg/day in 4-6 divided doses x 4-6 weeks AND IV Gentamicin 3mg/kg/day in 3 divided doses x 4-6 weeks	IV Vancomycin 40 mg/kg /day in 2 - 3 divided doses x 4-6 weeks AND IV/IM Gentamicin 3mg/kg/day in 3 divided doses x 4-6 weeks AND IV Ciprofloxacin 20-30 mg/kg/day in 2 divided doses x 4-6 weeks
Fungal Endocarditis *Candida spp* or *Aspergillosis*	IV Amphotericin B > 6 weeks AND Valve replacement surgery AND Long-term (lifelong) therapy with oral azole	

CARDIOLOGY

Table 4. Guidelines on IE prophylaxis

Endocarditis prophylaxis recommended	**Endocarditis prophylaxis *not* recommended**
High-risk category	*Negligible-risk category*
prosthetic cardiac valves	isolated secundum atrial septal defect
previous bacterial endocarditis	repaired atrial and ventricular septal defects, patent ductus arteriosus (after 6 mths)
complex cyanotic congenital heart disease	mitral valve prolapse without regurgitation
surgical systemic pulmonary shunts or conduits	functional, or innocent heart murmurs
Moderate-risk category	previous Kawasaki disease without valvar dysfunction
other congenital cardiac malformations (other than above and below)	previous rheumatic fever without valvar dysfunction
acquired valvar dysfunction (e.g. rheumatic heart disease)	cardiac pacemakers and implanted defibrillators
hypertrophic cardiomyopathy	
mitral valve prolapse with regurgitation	

Table 5. Common procedures that require IE prophylaxis

Oral, dental procedures	*Gastrointestinal procedures*
extractions, periodontal procedures	sclerotherapy for esophageal varices
placement of orthodontic bands (but not brackets)	oesophageal stricture dilatation
intraligamentary local anaesthetic injections	endoscopic retrograde cholangiography
prophylactic cleaning of teeth	biliary tract surgery
Respiratory procedures	surgical operations involving intestinal mucosa
tonsillectomy or adenoidectomy	*Genitourinary procedures*
surgical operations involving respiratory mucosa	cystoscopy
rigid bronchoscopy	urethral dilation
flexible bronchoscopy with biopsy	

Table 6. Antibiotic guidelines for IE prophylaxis

Endocarditis Prophylactic Regimens for Dental, Oral, Respiratory Tract and Esophageal Procedures

Standard general prophylaxis

Oral Amoxicillin 50 mg/kg (max 2 Gm)
one hour before procedure
or
IV/IM Ampicillin 50 mg/kg (max 2 Gm)

Penicillin allergy

Oral Clindamycin 20 mg/kg (max 600 mg)
or
Oral Cephalexin 50 mg/kg (max 2 Gm)
or
Oral Azithromycin/clarithromycin 50 mg/kg (max 500 mg)
or
Oral Erythromycin 20 mg/kg (max 3 Gm)
or
IV Clindamycin 20 mg/kg (max 600 mg)

Note: give oral therapy 1 hour before procedure ;
IV therapy 30 mins before procedure