INFECTIVE ENDOCARDITIS (IE)

(Last updated 07/23/2019 Reviewed by: Kang An, MD)

PRESENTING COMPLAINT: Malaise, chest pain, shortness of breath

FINDINGS

- **A** Check airway
- **B** +/-RR
- **C** ↓ /N BP, ↑ HR, heart murmur
- **D** Variable altered (V,P,U,D)*
- **E** Fever, Osler nodes, Roth spots, Janeway lesions
- **Lpc** ↑ WBC, ↓ Hb, Blood cultures, ↑ Lactate, ↓ Platelets
- **Upc** Echocardiography: vegetation, abscess

***V** (verbal), **P (**pain), **U** (unconsciousness), **D** (delirious)

$\mathbf{U_{PC}}$ (point of care ultrasound) $\mathbf{L_{PC}}$ (point of care labs)

OTHER HISTORY

- **Symptoms and signs:** Fever, heart murmur, anemia, dyspnea, cough, lightheadedness, syncope
- **Predisposing Conditions**: Patient factors (Age > 60 years, male sex, injection drug use, poor dentition, dental infection or recent dental care), comorbid conditions (structural heart disease, valvular disease, congenital heart disease, prosthetic heart valve(s), history of infective endocarditis, presence of intravascular device, chronic hemodialysis, HIV infection)

DIFFERENTIAL DIAGNOSES

- Skin and soft tissue infection, cardiac device infection, prosthetic joint infection, intravascular catheter infection, musculoskeletal infection, meningitis, pulmonary embolism, vasculitis, neoplasia

OTHER INVESTIGATIONS

- All patients with suspected or confirmed IE should be admitted to the hospital, with transthoracic-Echo (TTE), serial blood cultures
- **Labs**: Blood cultures (three sets in first 24 hr), complete blood cell count (anemia and leukocytosis), erythrocyte sedimentation rate and C-reactive protein value (elevated), urinary dipstick (hematuria and proteinuria), differential diagnoses-oriented alternative cultures (e.g. lumbar puncture), rheumatologic tests, bone marrow aspiration
- **Diagnostic criteria:** see table
- **Imaging**: Echocardiography (trans thoracic AND trans-esophageal echocardiogram), chest radiograph, sinus and dental X-Ray, CT body to rule out other conditions

THERAPEUTIC INTERVENTIONS

- **Medications**: Empiric IV antibiotic biotherapy, before culture results but after sample, consider thrombolytic in case of acute thrombotic valvular occlusion
- **Procedures:** Supplemental oxygen and ventilatory support, as necessary; circulatory failure as a result of either cardiogenic or septic shock should be corrected with volume expansion and/or pressor support following the sepsis bundle; refractory cardiogenic shock may require the use of an intraaortic balloon counterpulsation device or emergency heart surgery: contraindicated in patients with aortic insufficiency
- **Consult**: Infectious disease specialist, cardiologist, cardiac surgeon

ONGOING TREATMENT

- **Further diagnostics:** Chest CT and transesophageal-Echo (TEE); monitor with ECG
- **Further Treatment:** Surgical therapy and removal of infected medical hardware or infection source
- **Prophylaxis**: Patients at high risk for an adverse outcome from infective endocarditis should receive antimicrobial prophylaxis for the procedures like dental procedures, otorhinolaryngology/respiratory procedures, minor surgical procedures

CAUTIONS

- **Complications**: Septic shock, cardiogenic shock, stroke

TABLE

Modified Duke criteria for diagnosis of infective endocarditis - table A

Definite IE
Pathologic criteria
Microorganism: demonstrated by culture or histology in a vegetation, or in a vegetation that has embolized, or in an intracardiac abscess **OR**
Pathologic lesions: vegetation or intracardiac abscess, confirmed by histology showing active endocarditis
Clinical criteria
Using specific definitions listed in **Table B:**
2 major criteria **OR**
1 major and 3 minor criteria **OR**
5 minor criteria
Possible IE*
1 major criterion and 1 minor criterion **OR** 3 minor criteria
Rejected IE
Firm alternate diagnosis for manifestations of endocarditis **OR**

	Resolution of manifestations of endocarditis, with antibiotic therapy for four days or less **OR**
	No pathologic evidence of infective endocarditis at surgery or autopsy after antibiotic therapy for four days or less
	Does not meet criteria for possible infective endocarditis, as above

* *The category of possible IE represents a modification from the previous published Duke criteria*

Modified Duke criteria for diagnosis of infective endocarditis - table B

	Major criteria
Positive blood cultures for IE	
Typical microorganism for infective endocarditis from two separate blood cultures	
	Viridans streptococci
	Streptococcus gallolyticus (formerly S. bovis), including nutritional variant strains (Granulicatella spp and Abiotrophia defectiva)
	HACEK group - Haemophilus spp, Aggregatibacter (formerly Actinobacillus actinomycete comitants), Cardiobacterium hominis, Eikenella spp, and Kingella kingae
	Staphylococcus aureus
	Community-acquired enterococci, in the absence of a primary focus; **OR**
Persistently positive blood culture, defined as recovery of a microorganism consistent with IE from:	
	Blood cultures drawn more than 12 hours apart **OR**
	All of three or a majority of four or more separate blood cultures, with first and last drawn at least one hour apart
Single positive blood culture for Coxiella burnetii or antiphase I IgG antibody titer >1:800*	
Evidence of endocardial involvement	
Positive echocardiogram for IE	
	TEE recommended in patients with prosthetic valves, rated at least "possible IE" by clinical criteria, or complicated IE [paravalvular abscess]; TTE as first test in other patients*
	Definition of positive echocardiogram
	Oscillating intracardiac mass, on valve or supporting structures, or in the path of regurgitant jets, or on implanted material, in the absence of an alternative anatomic

	explanation **OR**
	Abscess **OR**
	New partial dehiscence of prosthetic valve
New valvular regurgitation	
	Increase in or change in preexisting murmur not sufficient
Minor criteria	
	Predisposition - predisposing heart condition or intravenous drug use
	Fever - 38.0°C (100.4°F)
	Vascular phenomena - major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial hemorrhage, conjunctival hemorrhages, Janeway lesions
	Immunologic phenomena - glomerulonephritis, Osler's nodes, Roth spots, rheumatoid factor
	Microbiologic evidence - positive blood culture but not meeting major criterion as noted previously (excluding single positive cultures for coagulase-negative straphylococci and organisms that do not cause endocarditis) **OR** serologic evidence of active infection with organism consistent with IE
	Echocardiographic minor criteria eliminated*

** Modifications from the previous published Duke criteria are noted by the asterisk*

REFERENCES & ACKNOWLEDGEMENTS

Acknowledgement: *MK Arslantas, MD; Benjamin Bonneton, MD; Philippe R. Bauer, MD*

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