

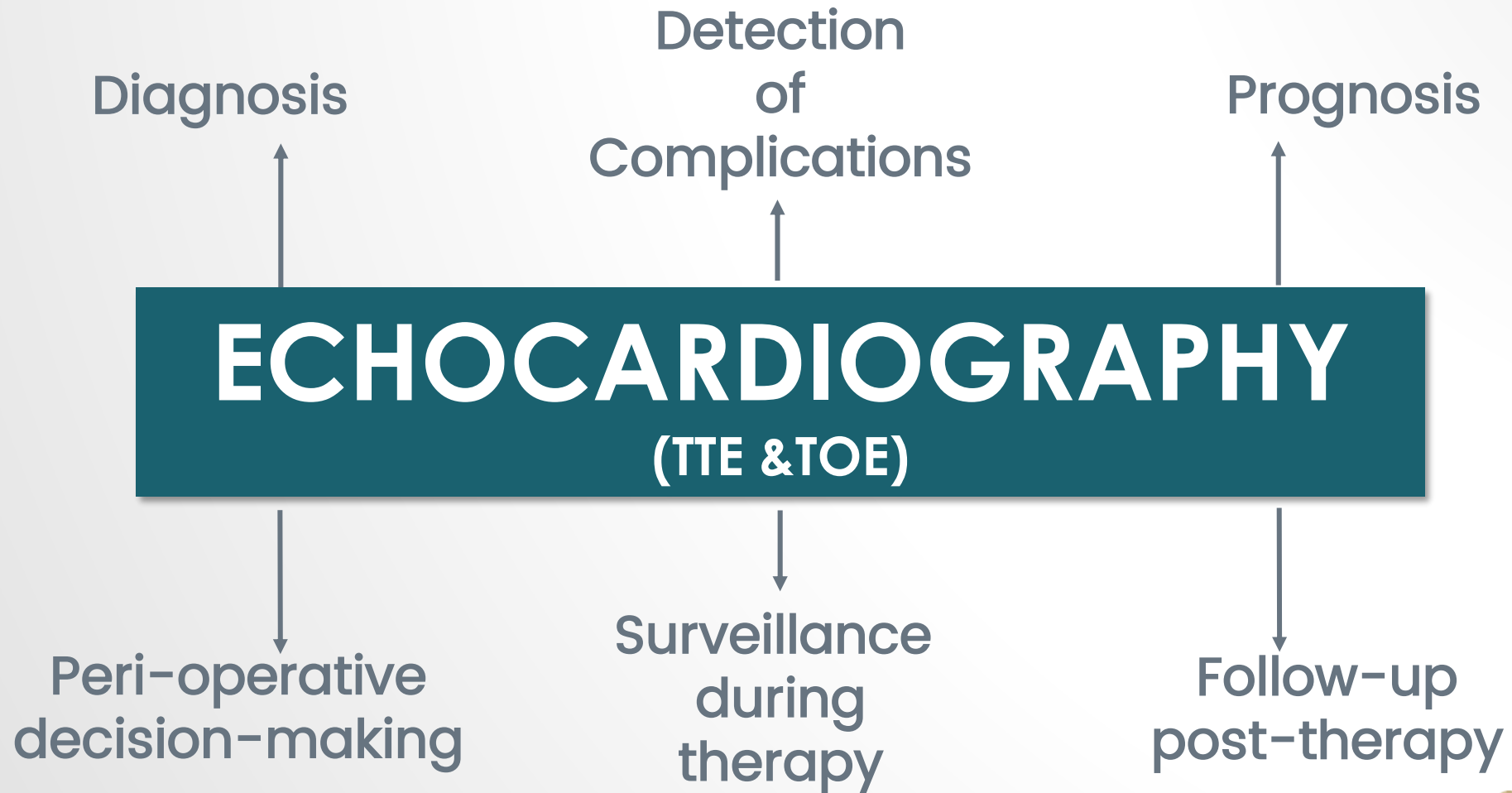


IMAGING IN INFECTIVE ENDOCARDITIS

DARRYL J BURSTOW



ROLE OF ECHO IN INFECTIVE ENDOCARDITIS



4 IMPORTANT AREAS : **DIAGNOSTIC** ROLE OF ECHO IN I.E.

1. Central role of Echocardiography in Duke Diagnostic Criteria

2. Utility of Transthoracic (TTE) vs Transoesophageal Echocardiography(TOE)

3. Red flags on TTE suggesting high risk features

4. Limitations of TOE

New Criteria for Diagnosis of Infective Endocarditis: Utilization of Specific Echocardiographic Findings

DAVID T. DURACK, M.B., D.Phil., ANDREA S. LUKES, B.A., DAVID K. BRIGHT, M.D., Pharm. D., and the DUKE
ENDOCARDITIS SERVICE, *Durham, North Carolina

Modified "DUKE" Criteria

2 MAJOR

- typical Blood cultures
- evidence of endocardial involvement

5 MINOR

- predisposition
- fever
- vascular phenomena
- immunological phenomena
- suggestive microbiology

Diagnostic categories

Definite

Possible

Rejected

Clinical criteria

- 2 major
- 1 major, 3 minor
- 5 minor

Durack DT, Lukes AS, Bright DK. New criteria for diagnosis of infective endocarditis: utilization of specific echocardiographic findings. Duke Endocarditis Service. Am J Med 1994;96:200–209.

Li JS, Sexton DJ, Mick N et al, Proposed modifications to the Duke criteria for the diagnosis of infective endocarditis. Clin Infect Dis 2000;30:633–638.

ECHO CRITERIA FOR ENDOCARDIAL INVOLVEMENT

- Vegetations (valves, jet lesions, synthetic material)
- Abscess (also includes pseudoaneurysm / fistula)*
- New partial dehiscence of a prosthetic valve
- Increasing valvular regurgitation#
- Valve perforation, aneurysm*

Recommended additions* / deletions#



European Heart Journal (2015) 36, 3075–3123
doi:10.1093/eurheartj/ehv319

ESC GUIDELINES



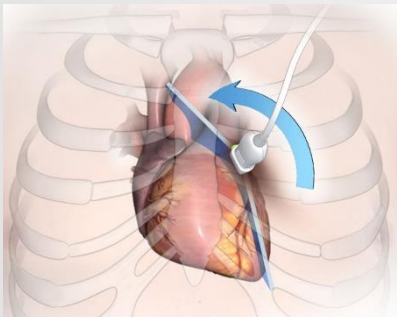
**2015 ESC Guidelines for the management
of infective endocarditis**

The Task Force for the Management of Infective Endocarditis of the
European Society of Cardiology (ESC)

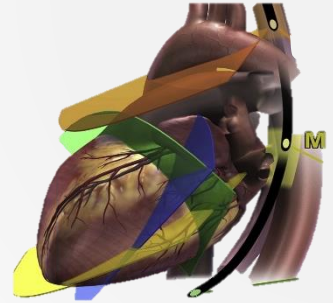


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DIAGNOSTIC ACCURACY OF **TTE VS TOE** FOR DETECTION OF VEGETATION OR ABSCESS IN **NATIVE VALVE IE**



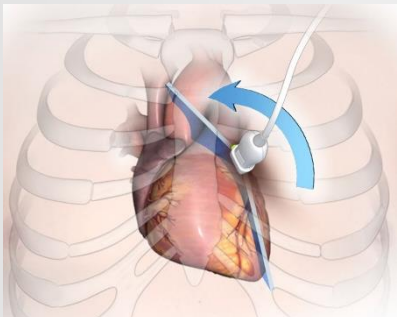
TTE

TOE

	Sens	Sens	Spec	Spec
Modality	TTE	TOE	TTE	TOE
Veg	55-68	92-94	>90	>90
Ab	27-33	36-87	>90	>90

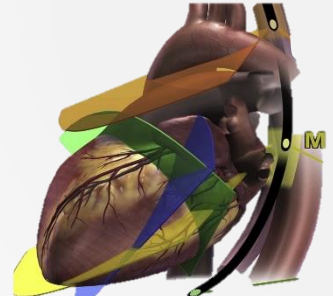
Sedgwick JF, Burstow DJ. Curr Infect Dis Rep. 2012 Aug;14(4):373-80





TTE

DIAGNOSTIC ACCURACY OF TTE VS TOE FOR DETECTION OF VEGETATION OR ABSCESS IN PROSTHETIC VALVE IE



TOE

	Sens	Sens	Spec	Spec
Modality	TTE	TOE	TTE	TOE
Veg	27-69	77-100	64	85-100
Ab	17-40	58-88	>90	>90

Sedgwick JF, Burstow DJ. Curr Infect Dis Rep. 2012 Aug;14(4):373-80



PREDICTORS OF POOR PROGNOSIS IN I.E.

Echo

- Periannular complications
- Large vegetations
- Severe left sided aortic regurgitation
- Severe prosthetic valve dysfunction
- Reduced LVEF
- Pulmonary HT
- Elevated LV diastolic pressures

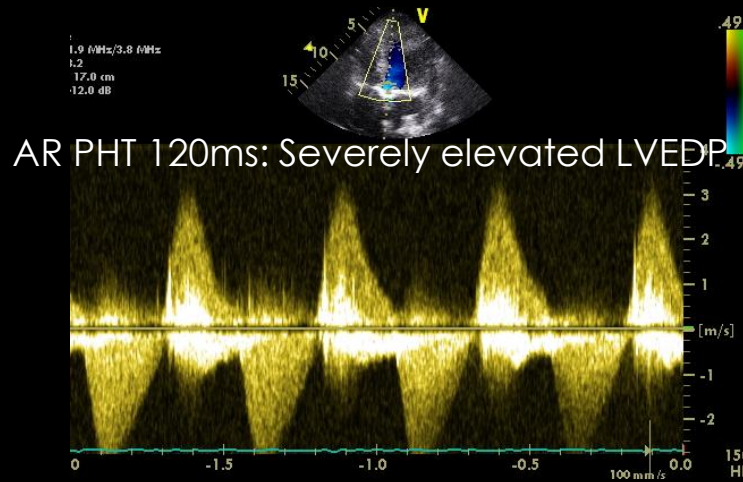
Clinical

- Uncontrolled infection
- Septic shock
- Heart failure
- > moderate area of ischaemic stroke
- Brain haemorrhage

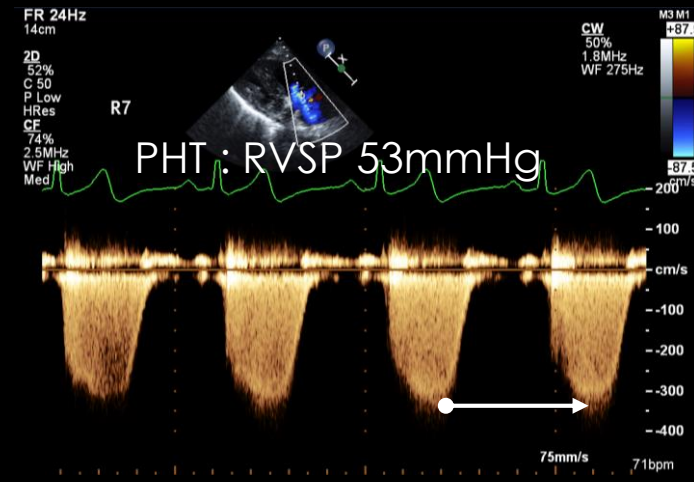
VALUE OF TTE : BASELINE ANATOMIC AND HAEMODYNAMIC ASSESSMENT



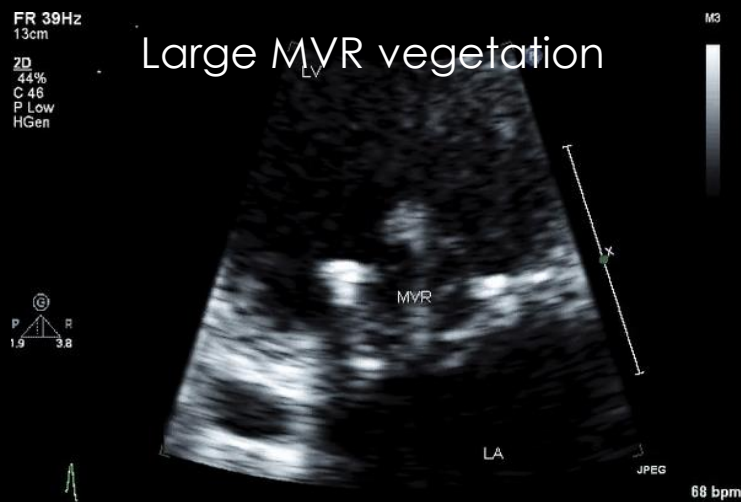
• LV size and function



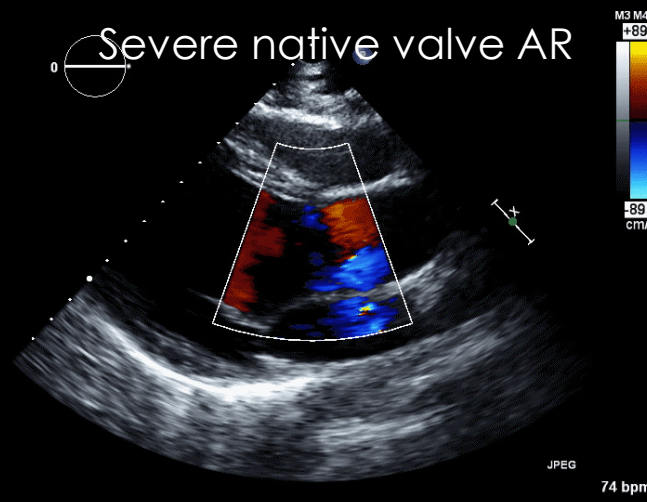
• LV filling pressures



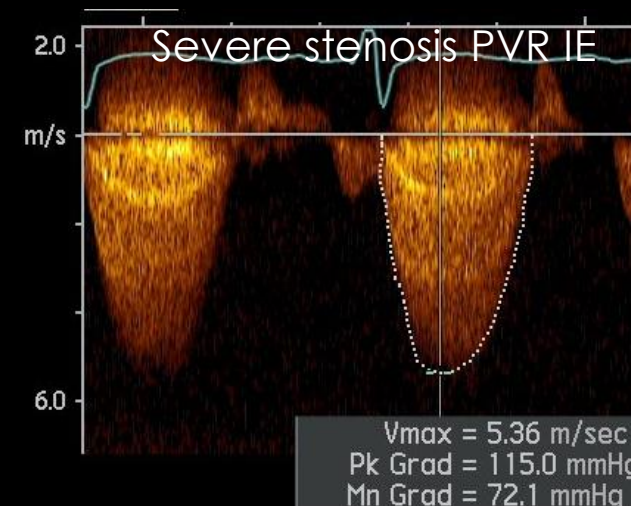
• Pulmonary pressures



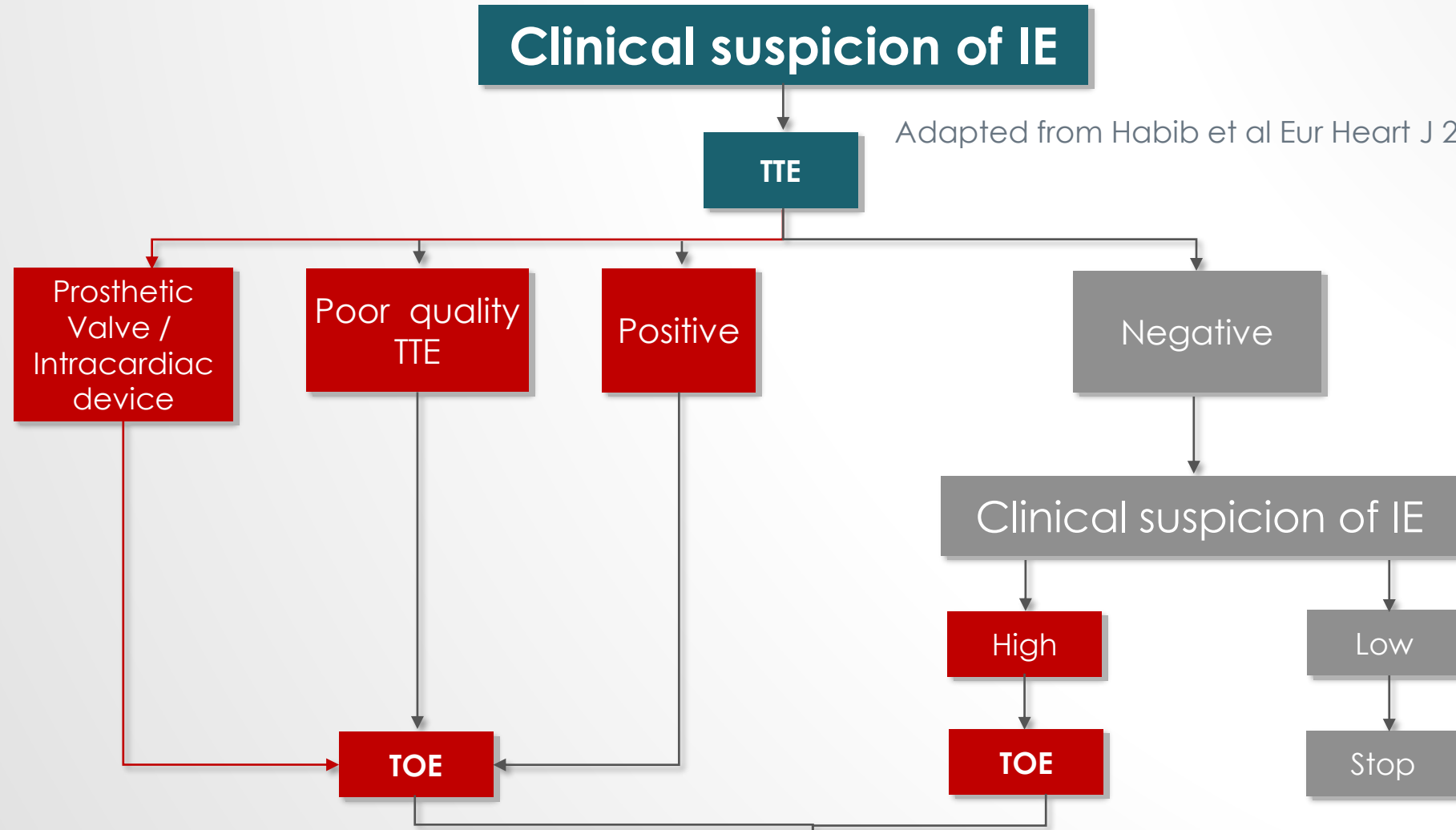
• Valve anatomy



• Valve haemodynamics



SUGGESTED IMAGING PATHWAY IN SUSPECTED IE



Adapted from Habib et al Eur Heart J 2009;30:2369–413.

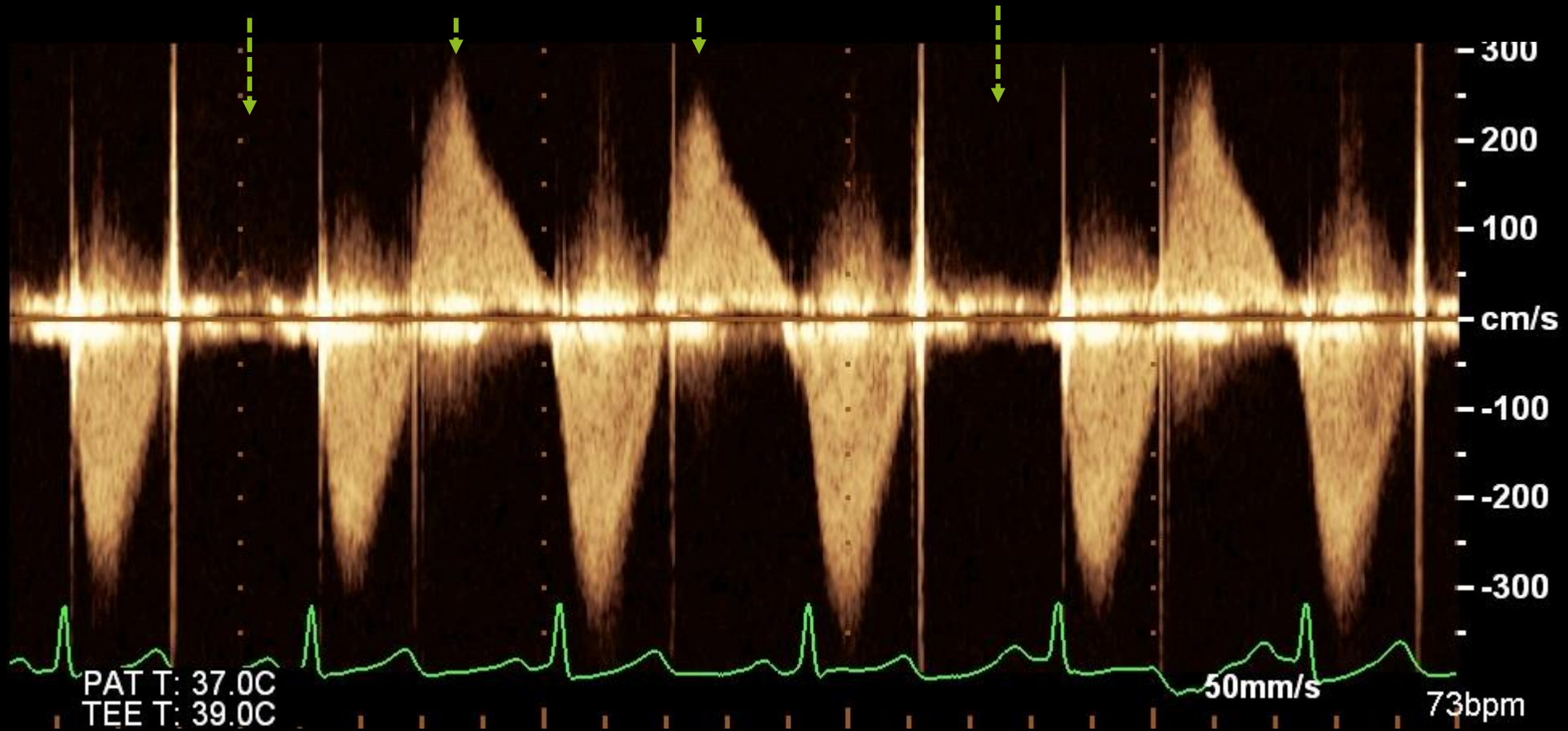
If initial TOE is neg but suspicion for IE remains, repeat TOE within 7-10 days



TTE RED FLAGS : FURTHER ASSESSMENT REQUIRED

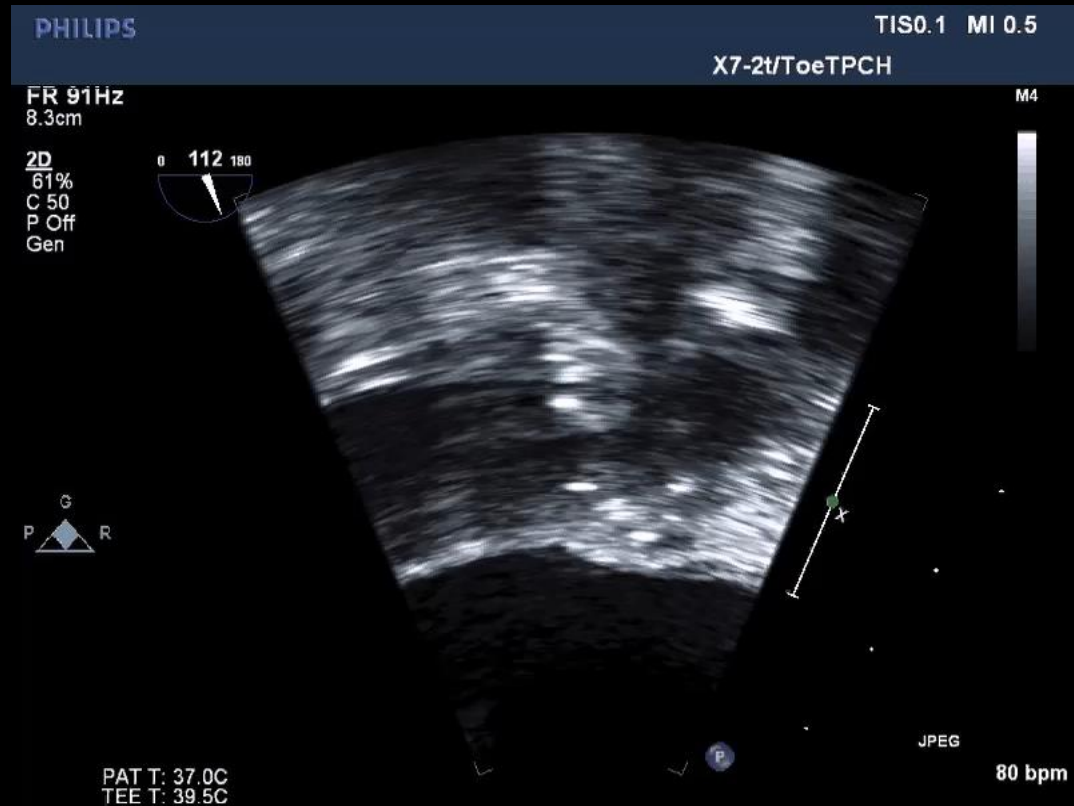
- **Poor image quality**
 - A negative study implies good image quality
- **Pre-existing degenerative valve disease**
- **New native valve regurgitation**
 - In comparison to a previous assessment
- **Any prosthetic valve or implanted device**
 - Unexplained anatomic abnormality
 - Abnormal haemodynamics

TTE 'Red flags' in PVE : PV dysfunction

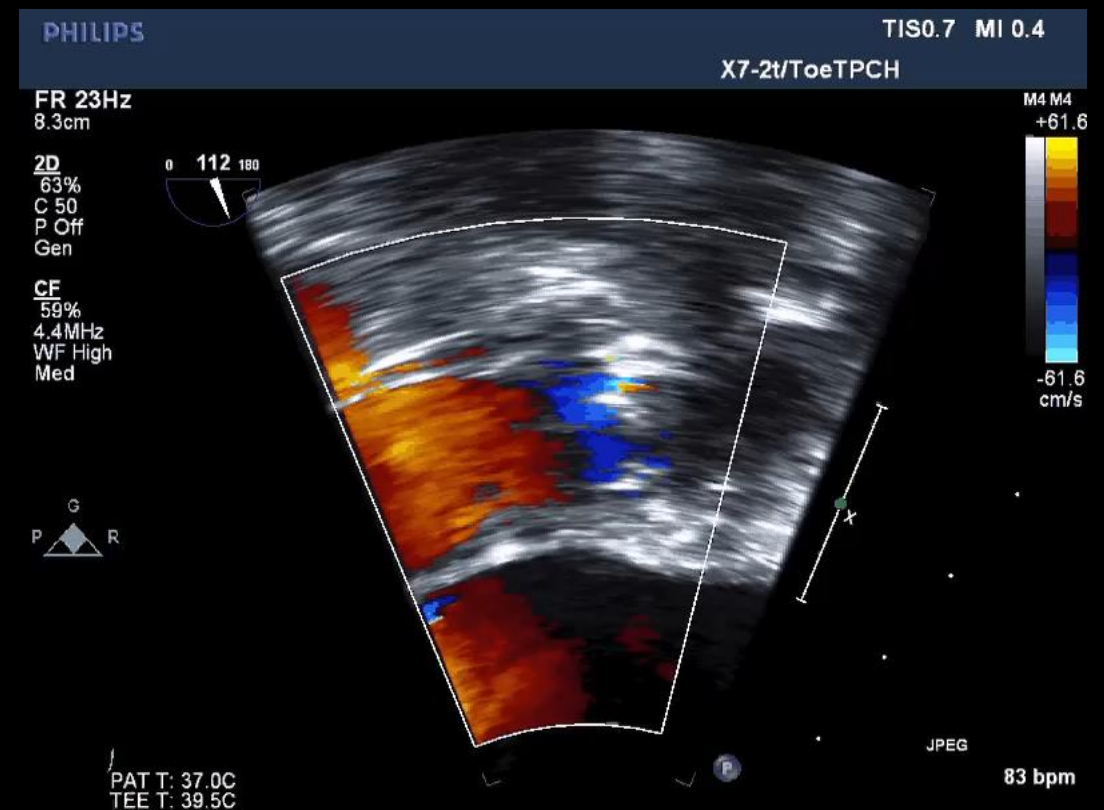


Intermittent AR

TOE confirmation: Vegetations causing leaflet motion abnormality



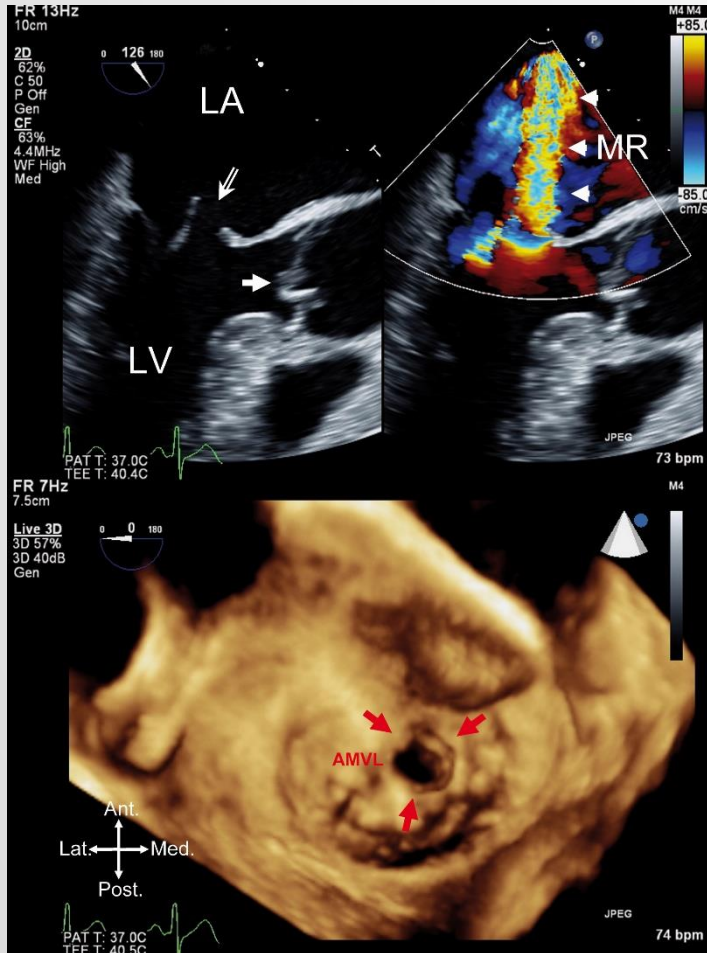
Abnormal leaflet motion



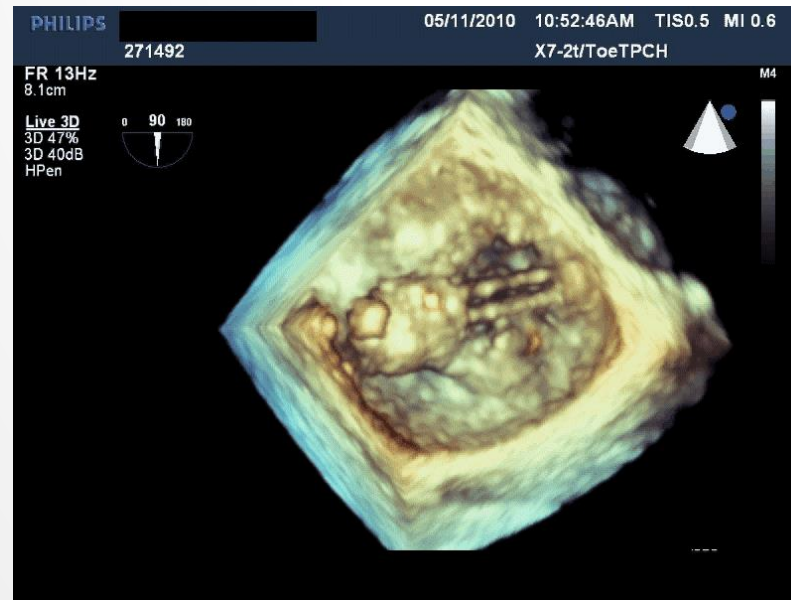
Intermittent AR

TOE : ITS VALUE AND LIMITATIONS

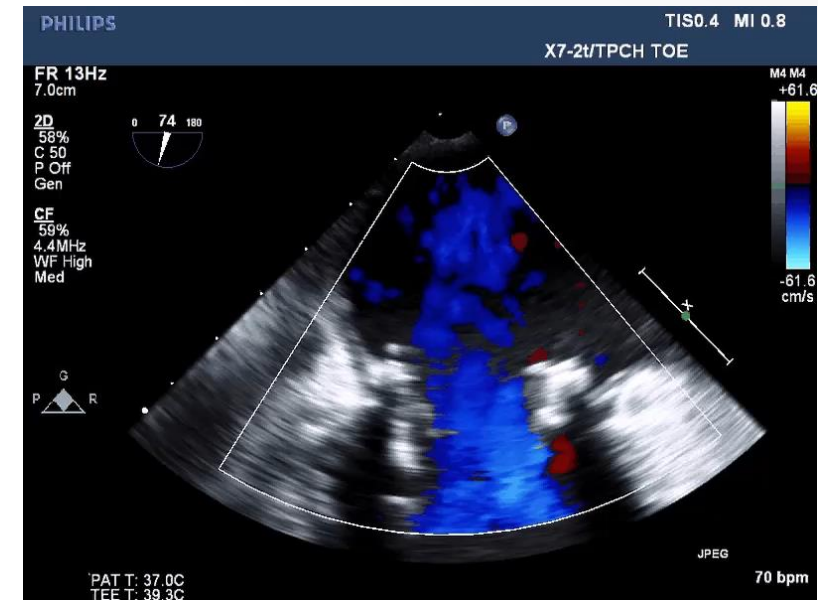
- Excellent for the assessment of the native mitral valve and mitral prosthesis



Mitral valve leaflet perforation



MVR vegetation with annular involvement



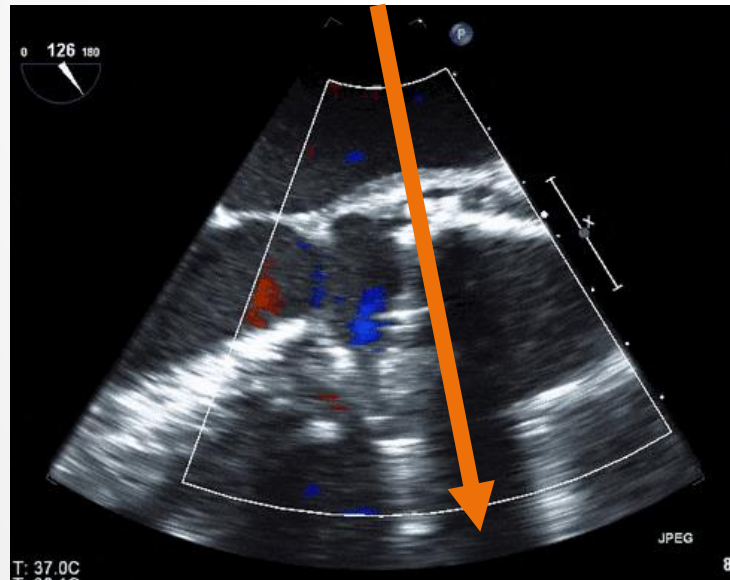
MVR with dehiscence

TOE : ITS VALUE AND LIMITATIONS

- Limitations of TOE in assessing anterior aortic annulus (particularly with AVR)
Aortic annulus requires combined TTE and TOE assessment



Limited anatomic assessment



TTE confirmed involvement of anterior annulus

TOE : ITS VALUE AND LIMITATIONS

- Supplementary imaging with cMR, cardiac CT and PET/CT in PVE



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doi:10.1093/eurheartj/ehv319

ESC GUIDELINES

2015 ESC Guidelines for the management of infective endocarditis

The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology (ESC)

2. Imaging positive for IE

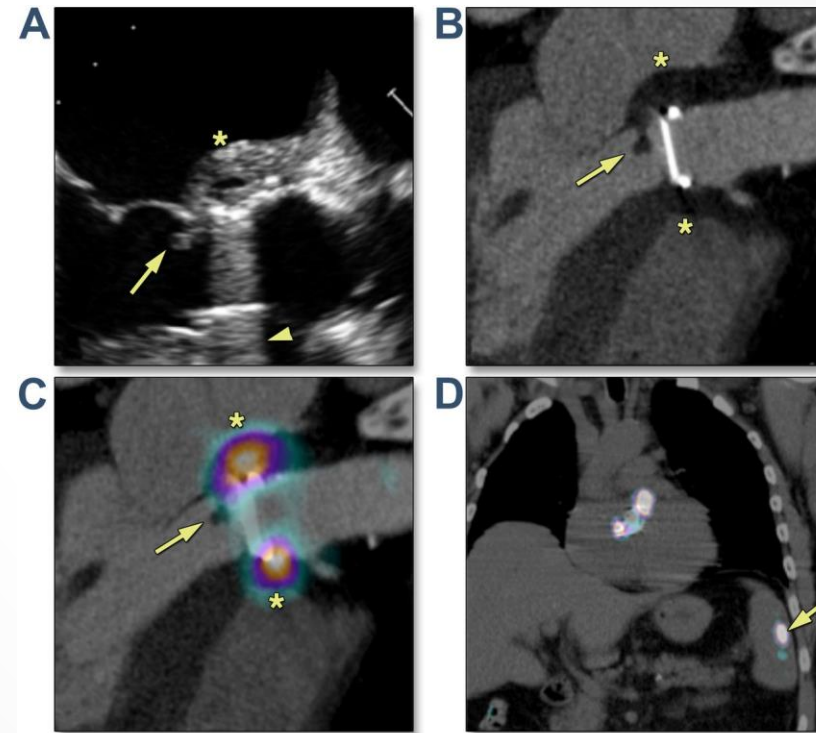
a. Echocardiogram positive for IE:

- Vegetation;
- Abscess, pseudoaneurysm, intracardiac fistula;
- Valvular perforation or aneurysm;
- New partial dehiscence of prosthetic valve.

b. Abnormal activity around the site of prosthetic valve implantation detected by ^{18}F -FDG PET/CT (only if the prosthesis was implanted for >3 months) or radiolabelled leukocytes SPECT/CT.

c. Definite paravalvular lesions by cardiac CT.

CMR : AVR with PA



CT/PET : AVR with root abscess

Wilco Tanis et al. JIMG 2013;6:1008-1013



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CONCLUSIONS

- Echocardiography plays a central diagnostic role in IE
 - Echo evidence of endocardial involvement a MAJOR diagnostic criteria
- TOE has superior diagnostic yield and should always be performed in absence of contraindications
- TTE provides an important baseline anatomic and haemodynamic assessment
 - Look out for 'Red flags'
- Be aware of the benefits and limitations of TOE particularly when assessing aortic prostheses
 - Supplementary role of cMR/CT