



Echocardiography in Endocarditis

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July 2016**

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Demographics of IE

- Incidence is 1.4 – 12.7/100,000 person-years
- Underlying rheumatic disease is up to 20x more prevalent in low-middle income countries (LMIC) vs high income countries; health-care associated IE increasingly important in HIC
- Age is typically younger in LMIC (20 – 40) and Staph and Strep are equally prevalent

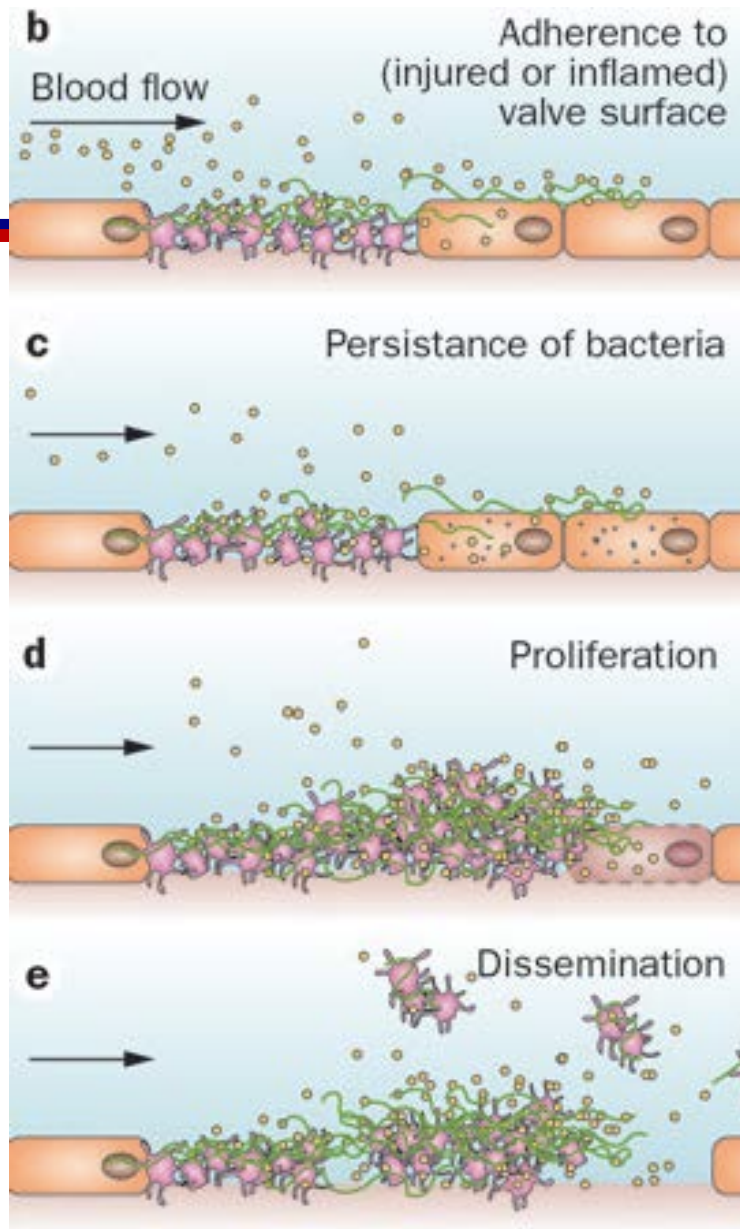
Nat. Rev. Cardiol. 11:35



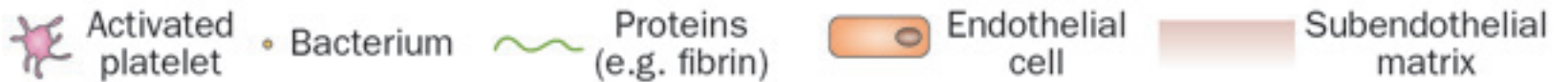
Pre-existing valvular disease promotes infection:

- Bacteria get deposited at the low-pressure sink immediately beyond a stenotic orifice or where a jet lesion strikes
- Thrombotic material deposited at same site; platelet-fibrin aggregates form an ideal seeding ground for circulating bacteria

Nat. Rev. Cardiol. 11:35



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Echocardiography in IE

- Echocardiography is the preferred tool for diagnosis
- Provides information on the hemodynamic consequences of IE
- Plays an important part in management
- Identifies markers of high risk



Table 4. Use of Echocardiography During Diagnosis and Treatment of Endocarditis

Early

Echocardiography as soon as possible (<12 h after initial evaluation)
TEE preferred; obtain TTE views of any abnormal findings for later comparison

TTE if TEE is not immediately available

TTE may be sufficient in small children

Repeat echocardiography

TEE after positive TTE as soon as possible in patients at high risk for complications

TEE 3–5 d after initial TEE if suspicion exists without diagnosis of IE or with worrisome clinical course during early treatment of IE

Intraoperative

Prepump

Identification of vegetations, mechanism of regurgitation, abscesses, fistulas, and pseudoaneurysms

Postpump

Confirmation of successful repair of abnormal findings

Assessment of residual valve dysfunction

Elevated afterload if necessary to avoid underestimating valve insufficiency or presence of residual abnormal flow

Completion of therapy

Establish new baseline for valve function and morphology and ventricular size and function

TTE usually adequate; TEE or review of intraoperative TEE may be needed for complex anatomy to establish new baseline

Table 10 Role of echocardiography in infective endocarditis

Recommendations	Class ^a	Level ^b	Ref. ^c
A. Diagnosis			
• TTE is recommended as the first-line imaging modality in suspected IE.	I	B	64,65
• TOE is recommended in all patients with clinical suspicion of IE and a negative or non-diagnostic TTE.	I	B	64, 68–71
• TOE is recommended in patients with clinical suspicion of IE, when a prosthetic heart valve or an intracardiac device is present.	I	B	64,71
• Repeat TTE and /or TOE within 5–7 days is recommended in case of initially negative examination when clinical suspicion of IE remains high.	I	C	
• Echocardiography should be considered in <i>Staphylococcus aureus</i> bacteraemia.	IIa	B	66,67
• TOE should be considered in patients with suspected IE, even in cases with positive TTE, except in isolated right-sided native valve IE with good quality TTE examination and unequivocal echocardiographic findings.	IIa	C	
B. Follow-up under medical therapy			
• Repeat TTE and/or TOE are recommended as soon as a new complication of IE is suspected (new murmur, embolism, persisting fever, HF, abscess, atrioventricular block).	I	B	64,72

Table 10 Continued

Recommendations	Class ^a	Level ^b	Ref. ^c
• Repeat TTE and/or TOE should be considered during follow-up of uncomplicated IE, in order to detect new silent complications and monitor vegetation size. The timing and mode (TTE or TOE) of repeat examination depend on the initial findings, type of microorganism, and initial response to therapy.	IIa	B	64,72
C. Intraoperative echocardiography			
• Intraoperative echocardiography is recommended in all cases of IE requiring surgery.	I	B	64,73
D. Following completion of therapy			
• TTE is recommended at completion of antibiotic therapy for evaluation of cardiac and valve morphology and function.	I	C	

HF = heart failure; IE = infective endocarditis; TOE = transoesophageal echocardiography; TTE = transthoracic echocardiography.

^aClass of recommendation.

^bLevel of evidence.

^cReference(s) supporting recommendations.

2015 ESC Guidelines for the management of infective endocarditis



Table II Anatomical and echocardiographic definitions

	Surgery/necropsy	Echocardiography
Vegetation	Infected mass attached to an endocardial structure or on implanted intracardiac material.	Oscillating or non-oscillating intracardiac mass on valve or other endocardial structures, or on implanted intracardiac material.
Abscess	Perivalvular cavity with necrosis and purulent material not communicating with the cardiovascular lumen.	Thickened, non-homogeneous perivalvular area with echodense or echolucent appearance.
Pseudoaneurysm	Perivalvular cavity communicating with the cardiovascular lumen.	Pulsatile perivalvular echo-free space, with colour-Doppler flow detected.
Perforation	Interruption of endocardial tissue continuity.	Interruption of endocardial tissue continuity traversed by colour-Doppler flow.
Fistula	Communication between two neighbouring cavities through a perforation.	Colour-Doppler communication between two neighbouring cavities through a perforation.
Valve aneurysm	Saccular outpouching of valvular tissue.	Saccular bulging of valvular tissue.
Dehiscence of a prosthetic valve	Dehiscence of the prosthesis.	Paravalvular regurgitation identified by TTE/TOE, with or without rocking motion of the prosthesis.

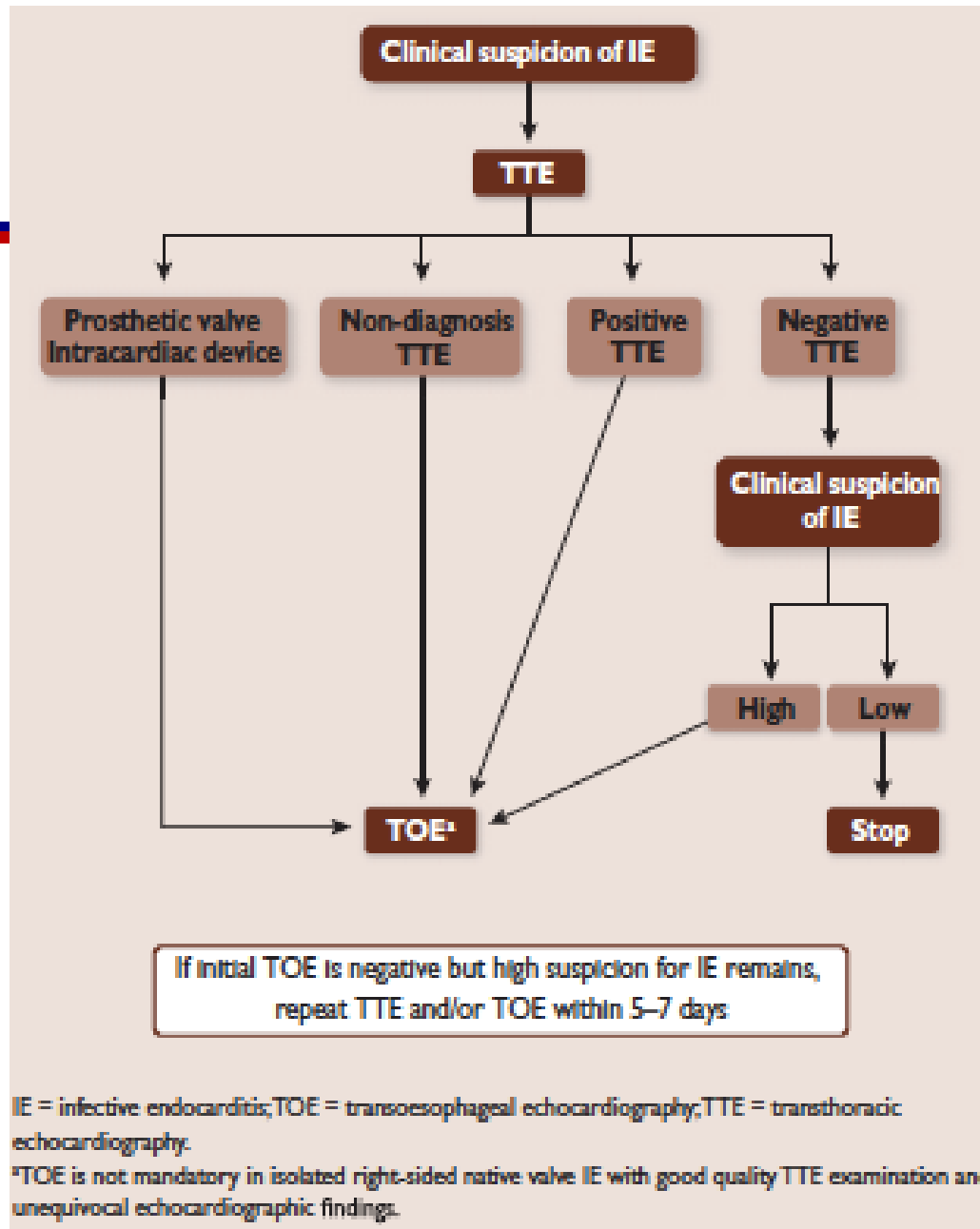
TOE = transoesophageal echocardiography; TTE = transthoracic echocardiography.



TTE vs TEE

- Sensitivity ~75% for TTE vs 85-90% for TEE - resolution is greater
- In nearly all cases TEE should be done
- TEE is essential for prosthetic valves
- TTE yields better information on valve function and hemodynamics

European Heart Journal (2014) 35, 624



2015 ESC Guidelines for the management of infective endocarditis



Echo Findings: A Major Criterion for Endocarditis (Modified Duke Criteria)

“Echocardiogram positive for IE (TEE recommended for patients with prosthetic valves, rated at least possible IE by clinical criteria, or complicated IE [paravalvular abscess]; TTE as first test in other patients) defined as follows: ***oscillating intracardiac mass on valve or supporting structures, in the path of regurgitant jets, or on implanted material in the absence of an alternative anatomic explanation; abscess; or new partial dehiscence of prosthetic valve or new valvular regurgitation*** (worsening or changing or pre-existing murmur not sufficient)”

Echocardiography should be performed expeditiously in patients suspected of having IE (***Class I; Level of Evidence A***)

AHA Scientific Statement on Infective Endocarditis 2015



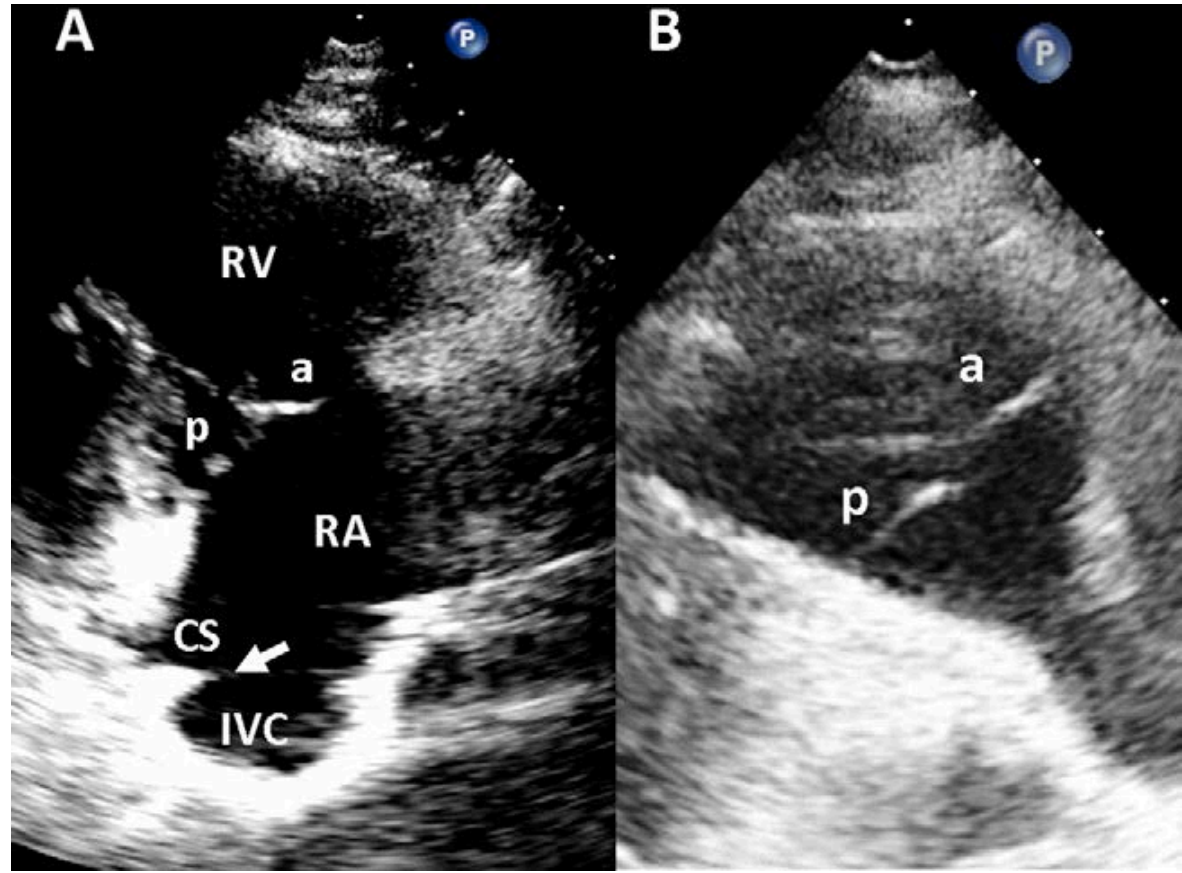
Right-Sided Endocarditis

- Patients with right-sided IE are younger, more often IV drug abusers, and have larger vegetations
- Pulmonary embolism is more frequent
- *S. Aureus* is cause in 80%

J Am Soc Echocardiogr 2012;25:807



RV inflow view is important as is RV outflow view



J Am Soc Echocardiogr
2012;25:807



Features indicating high risk for complications or need for surgery

- Large vegetations (>10 mm in diameter)
- Severe valvular insufficiency, valvular perforation or dehiscence
- Abscess cavities or pseudoaneurysms
- Evidence of decompensated heart failure

AHA Scientific Statement on Infective Endocarditis 2015



Table 5. Clinical and Echocardiographic Features That Suggest Potential Need for Surgical Intervention

Vegetation

Persistent vegetation after systemic embolization

Anterior mitral leaflet vegetation, particularly with size >10 mm*

≥1 Embolic events during first 2 wk of antimicrobial therapy*

Increase in vegetation size despite appropriate antimicrobial therapy*†

Valvular dysfunction

Acute aortic or mitral insufficiency with signs of ventricular failure†

Heart failure unresponsive to medical therapy†

Valve perforation or rupture†

Perivalvular extension

Valvular dehiscence, rupture, or fistula†

New heart block†‡

Large abscess or extension of abscess despite appropriate antimicrobial therapy†

See text for a more complete discussion of indications for surgery based on vegetation characterizations.

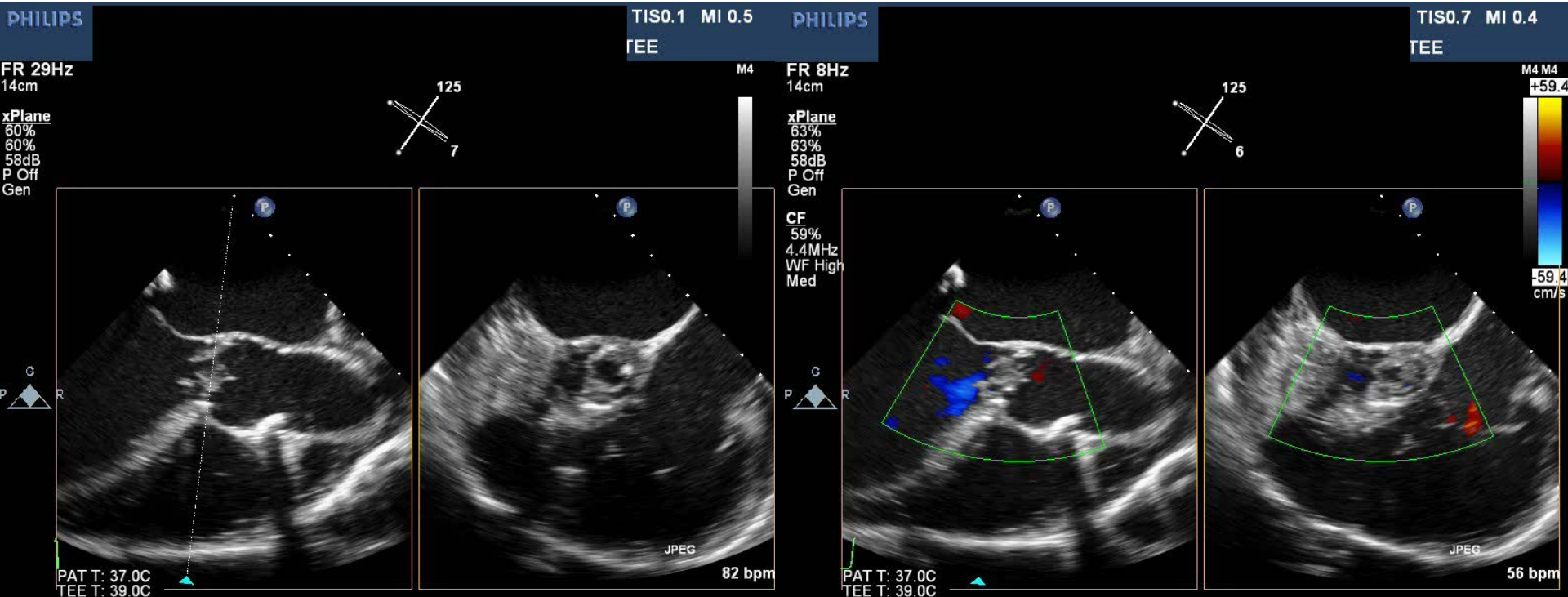
*Surgery may be required because of risk of embolization.

†Surgery may be required because of heart failure or failure of medical therapy.

‡Echocardiography should not be the primary modality used to detect or monitor heart block.



Echocardiography in IE



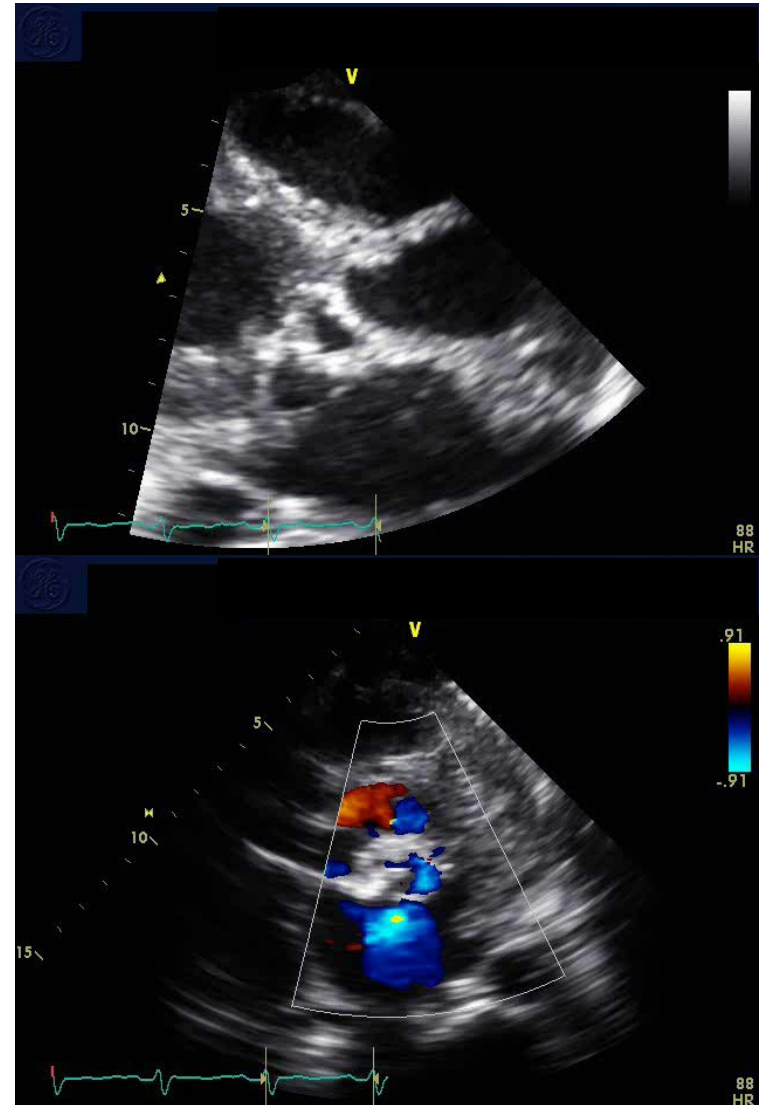
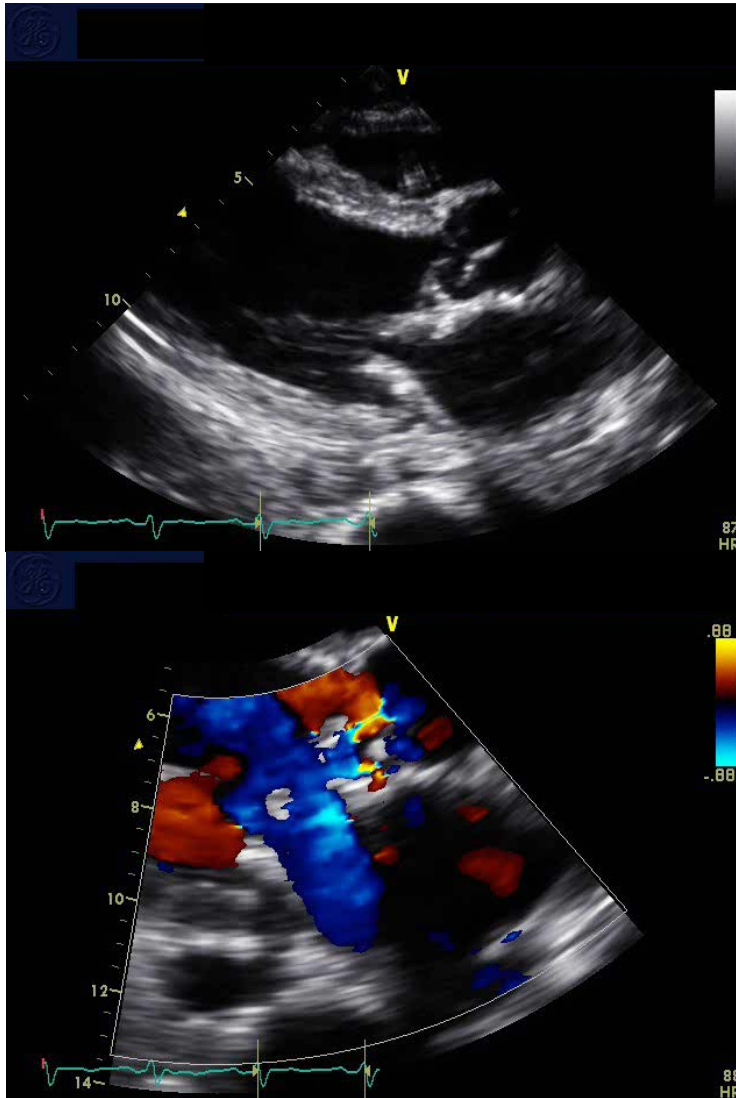


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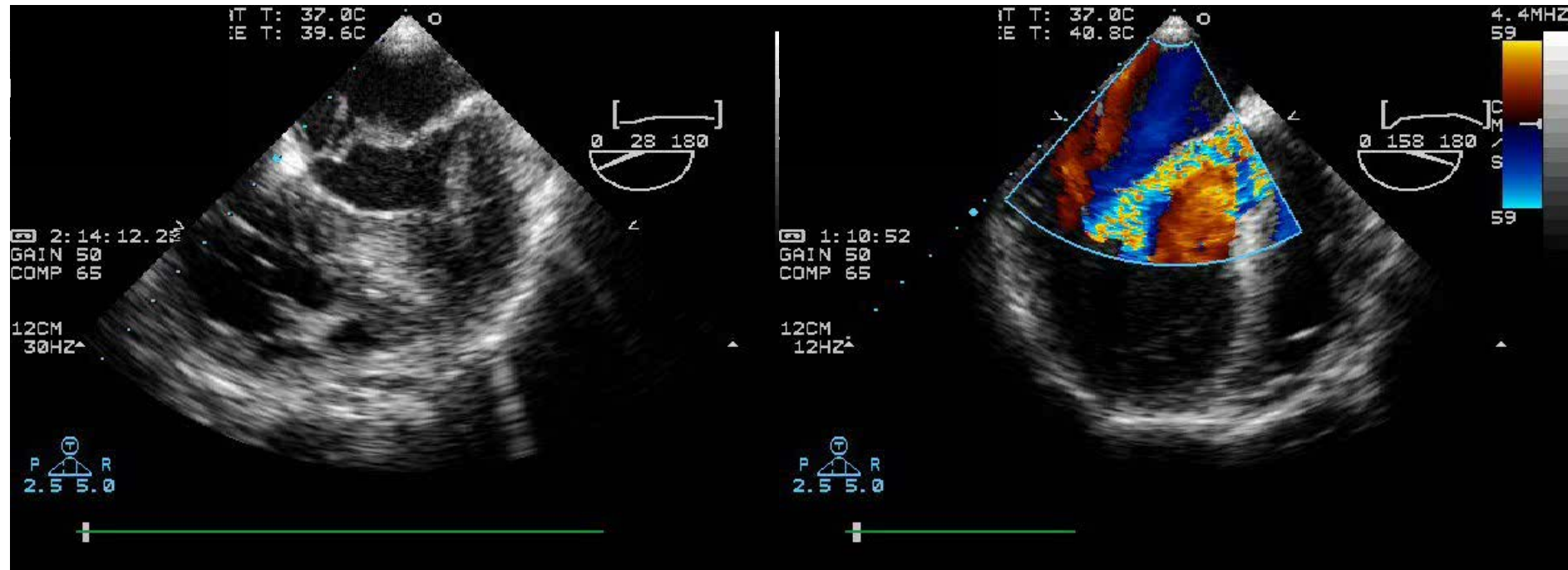


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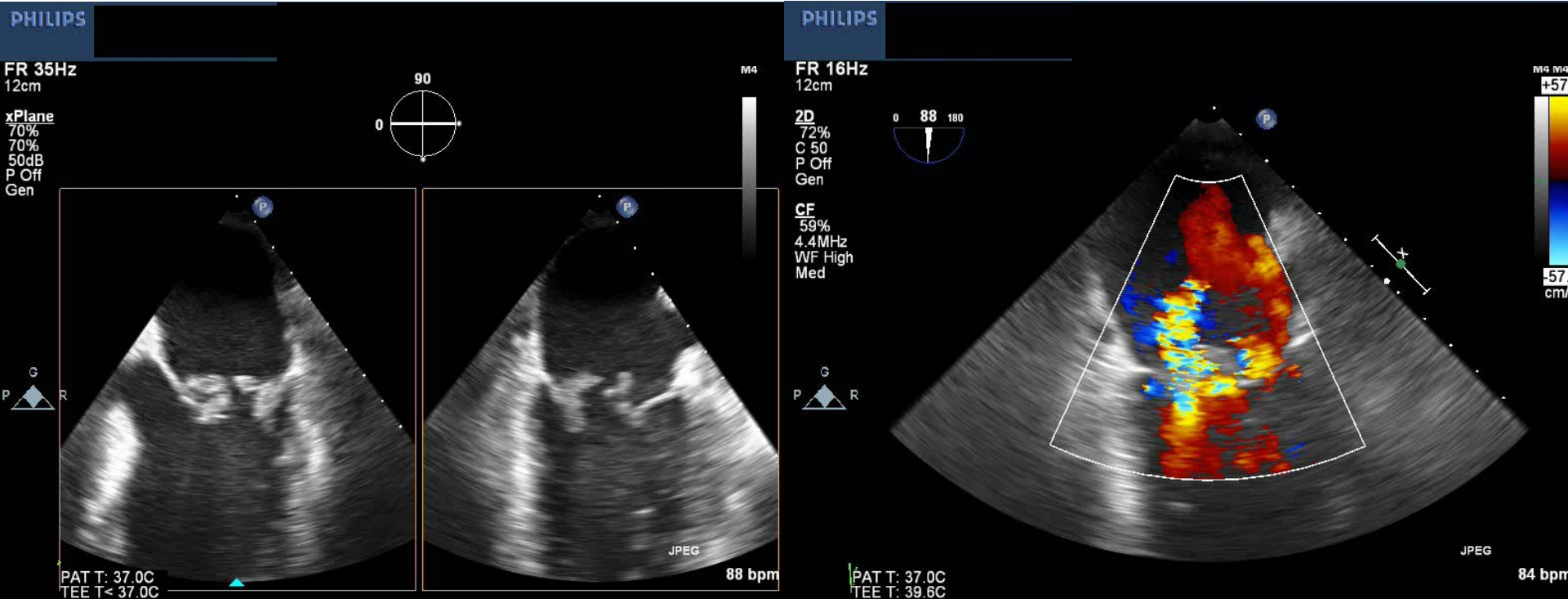


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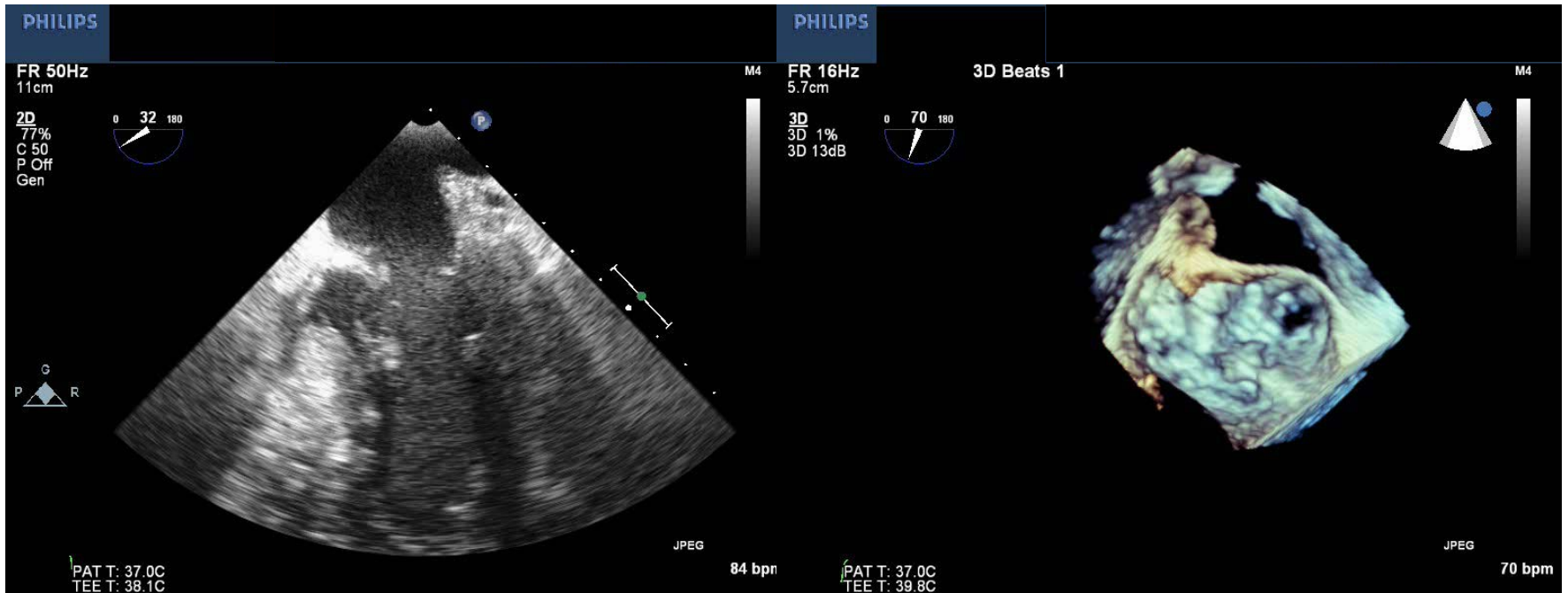


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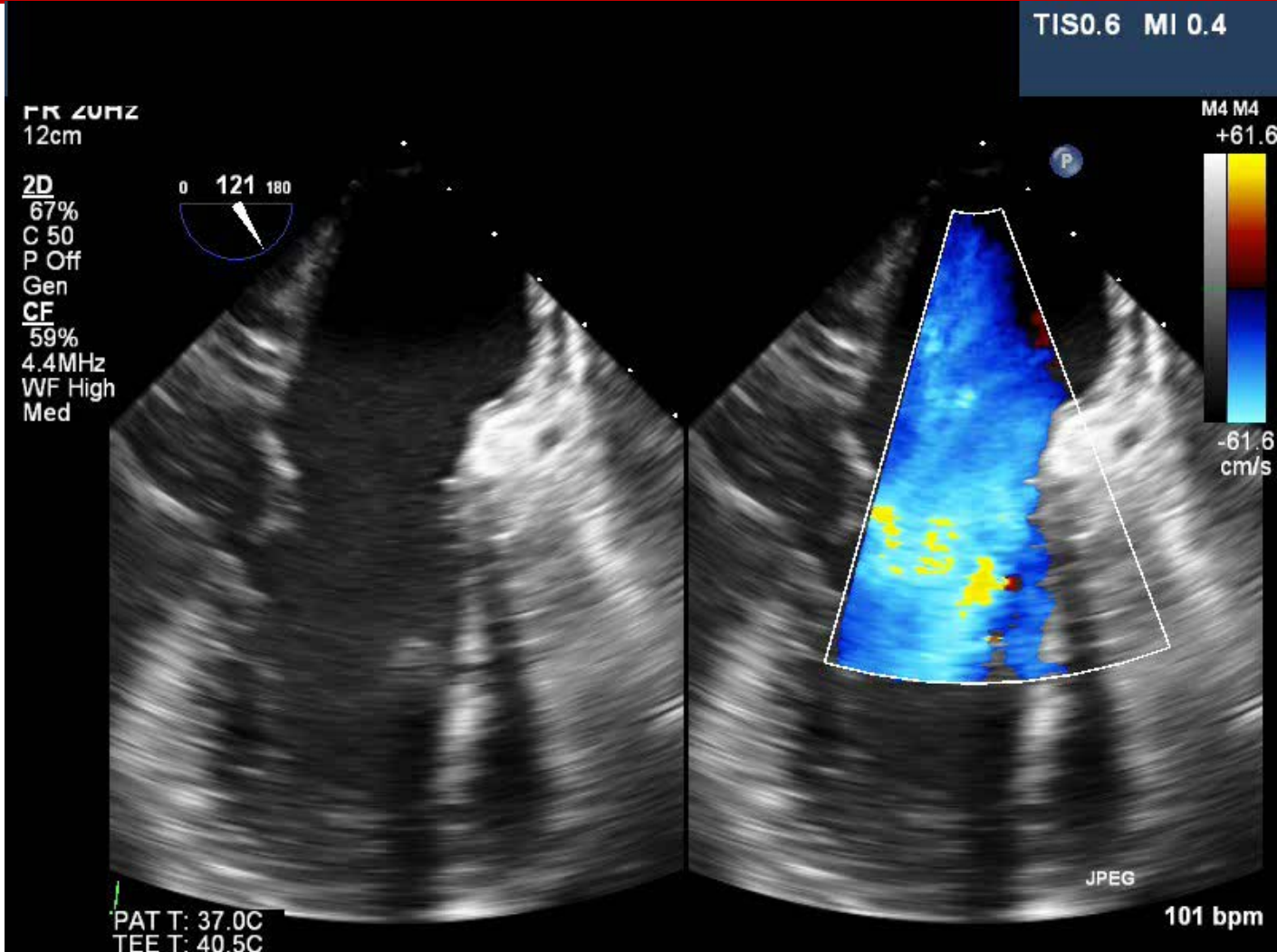


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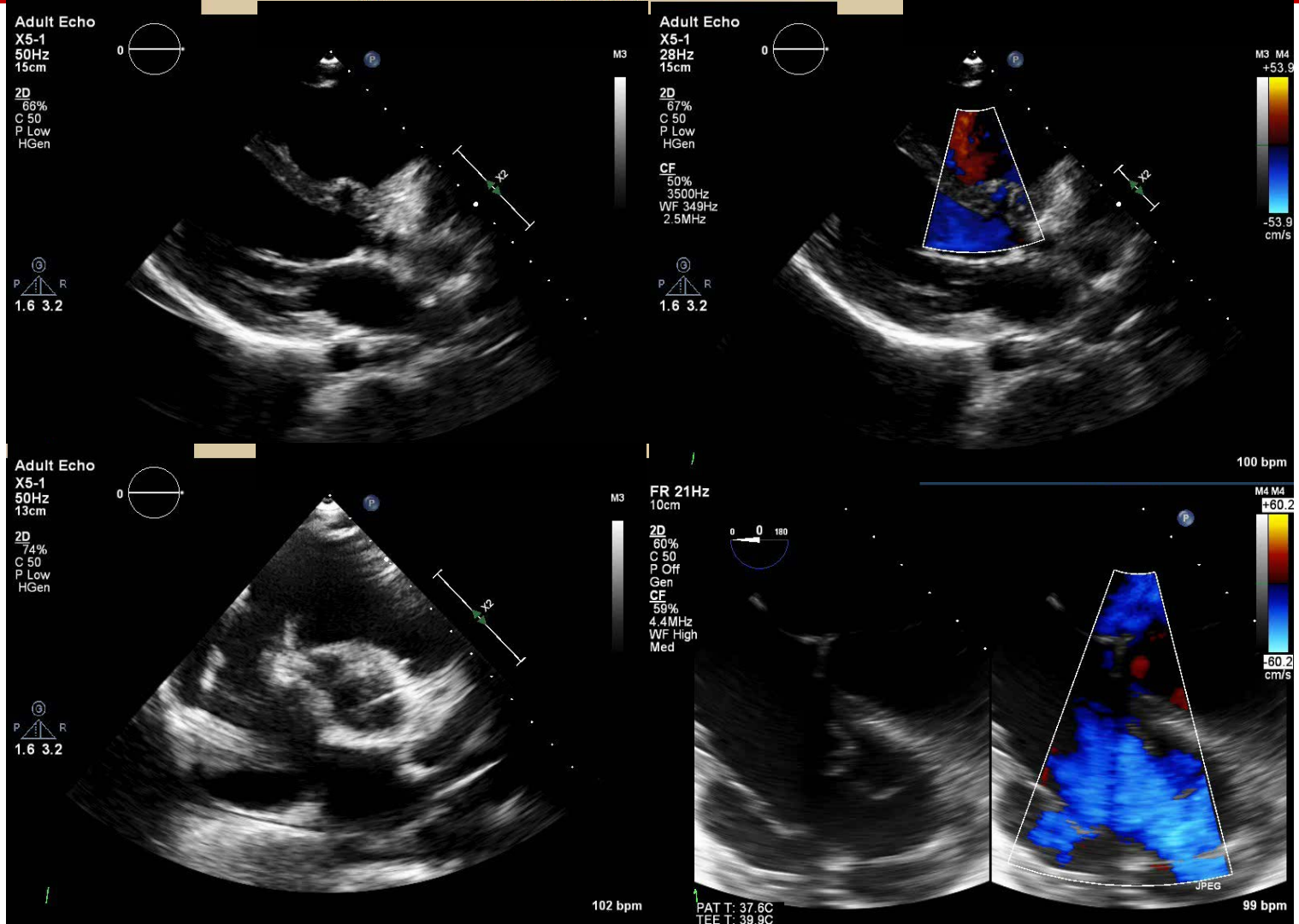


Echocardiography in IE





Echocardiography in IE





Echocardiography in IE

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