



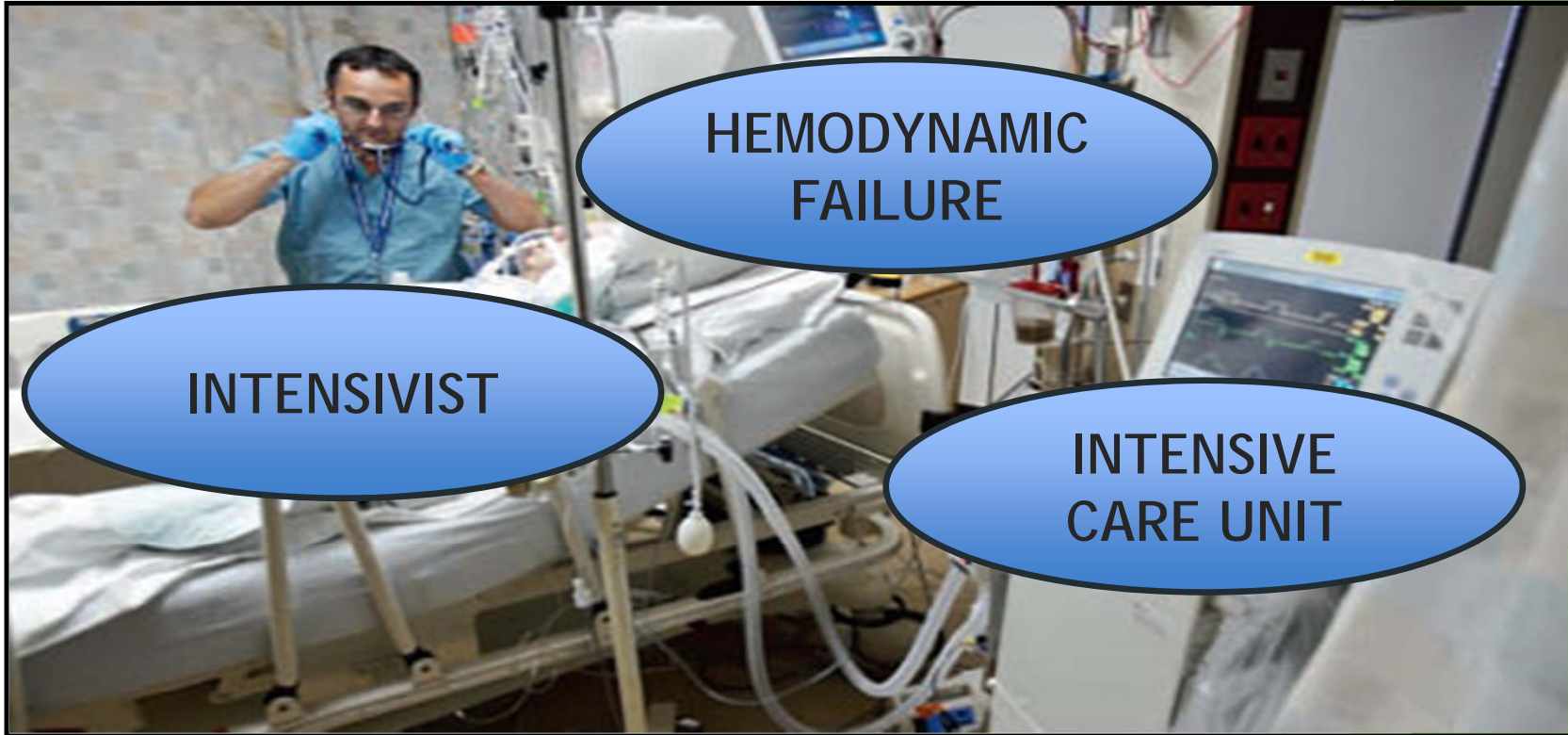
Respective advantages, disadvantages and mandatory views of TTE and TEE

Dr Ahmed EIMaghraby
Cardiology Specialist
Non-invasive Lab, HMC Heart Hospital

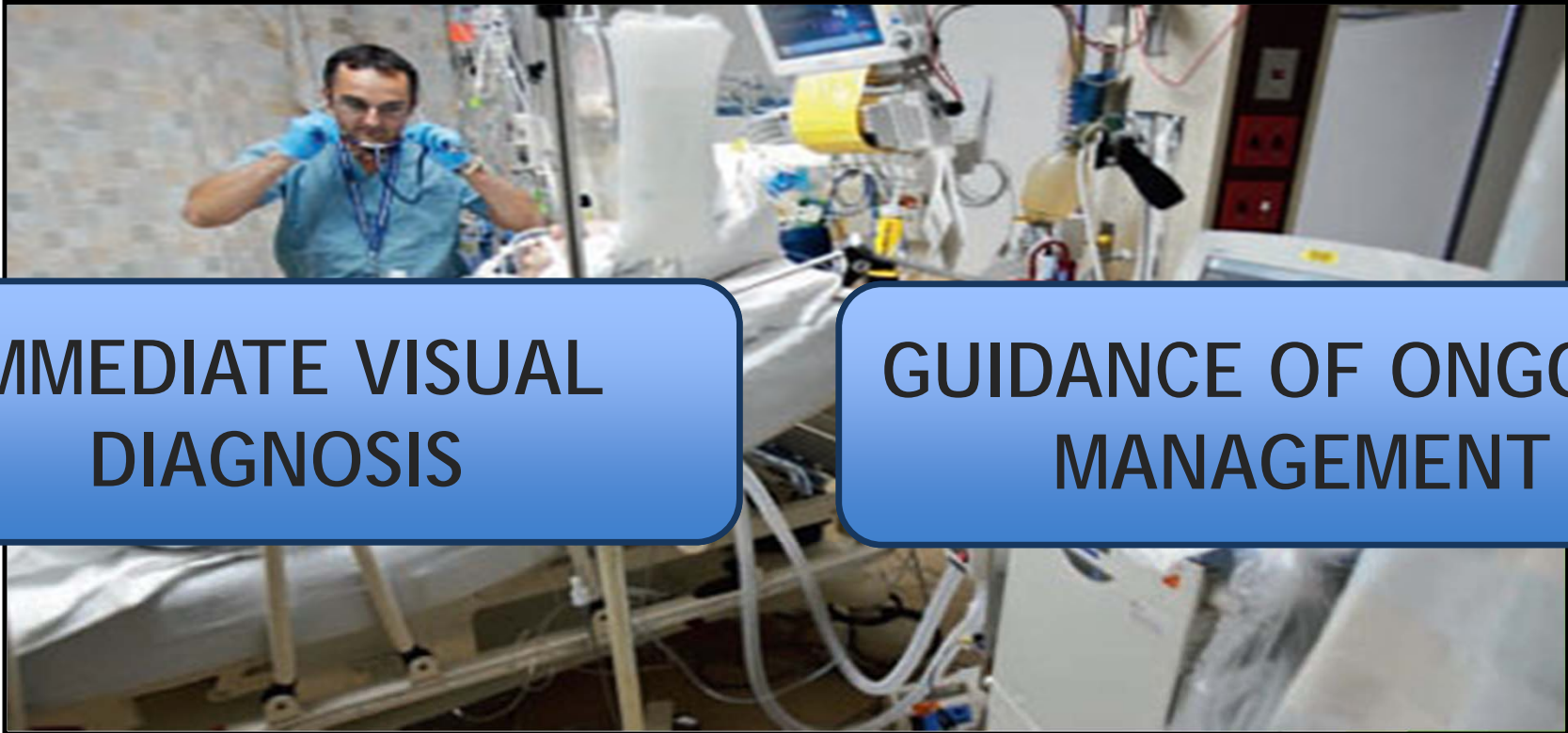
No Disclosures



CRITICAL CARE ECHOCARDIOGRAPHY



CRITICAL CARE ECHOCARDIOGRAPHY



**IMMEDIATE VISUAL
DIAGNOSIS**

**GUIDANCE OF ONGOING
MANAGEMENT**

Machines



Trans-Thoracic Echocardiography in ICU

Advantages	Disadvantages
<ul style="list-style-type: none">- EASY TO USE.- AVAILABLE- CAUSES NO HARM- Information is acquired in real time.- No health care practitioners are needed other than the performing physician- The information is obtained before the invasive monitoring.- COST-EFFECTIVE	<ul style="list-style-type: none">- Does not provide potential for continuous monitoring.- In several patients it is not possible to acquire all the classic echocardiographic views



Advanced Echocardiography for the Critical Care Physician

Part 2

Mangala Narasimhan, DO, FCCP; Seth J. Koenig, MD, FCCP; and Paul H. Mayo, MD, FCCP

This article is the second part of a series that describes practical techniques in advanced critical care echocardiography and their use in the management of hemodynamic instability. Measurement of left ventricular function and segmental wall motion abnormalities, evaluation of left ventricular filling pressures, assessment of right-sided heart function, and determination of pre-load sensitivity, including passive leg raising, are discussed. Video examples help to demonstrate techniques described in the text. *CHEST 2014; 145(1):135-142*

Abbreviations: 2DE = two-dimensional echocardiography; AP4 = apical four chamber; ASE = American Society of

European Heart Journal – Cardiovascular Imaging (2013) **14**, 1–11
doi:10.1093/ehjci/jes193

RECOMMENDED



European Heart Journal – Cardiovascular Imaging (2015) **16**, 119–146
doi:10.1093/ehjci/jeu210



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Concise Definitive Review: Focused Critical Care Echocardiography in the ICU

Achikam Oren-Grinberg, MD, MS¹, Daniel Talmor, MD, MPH¹, and Samuel M. Brown, MD, MS²



European Heart Journal – Cardiovascular Imaging (2013) **14**, 1–11
doi:10.1093/ehjci/jes193

The use of echocardiography in acute cardiovascular care: Recommendations of the European Association of Cardiovascular Imaging and the Acute Cardiovascular Care Association

Patrizio Lancellotti^{1*}, Susanna Price^{2*}, Thor Edvardsen³, Bernard Cosyns⁴, Aleksandar N. Neskovic⁵, Raluca Dulgheru¹, Frank A. Flachskampf⁶, Christian Hassager⁷, Agnes Pasquet⁸, Luna Gargani⁹, Maurizio Galderisi¹⁰, Nuno Cardim¹¹, Kristina H. Haugaa³, Arnaud Ancion¹, Jose-Luis Zamorano¹², Erwan Donal¹³, Héctor Bueno¹⁴, and Gilbert Habib¹⁵

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Emergency echocardiography: the European Association of Cardiovascular Imaging recommendations

Aleksandar N. Neskovic^{1*}, Andreas Hagendorff², Patrizio Lancellotti³, Fabio Guarracino⁴, Albert Varga⁵, Bernard Cosyns⁶, Frank A. Flachskampf⁷, Bogdan A. Popescu⁸, Luna Gargani⁹, Jose Luis Zamorano¹⁰, and Luigi P. I. Di Tomasso¹¹ on behalf of the European Association of Cardiovascular Imaging[†]

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FOCUS cardiac Ultrasound

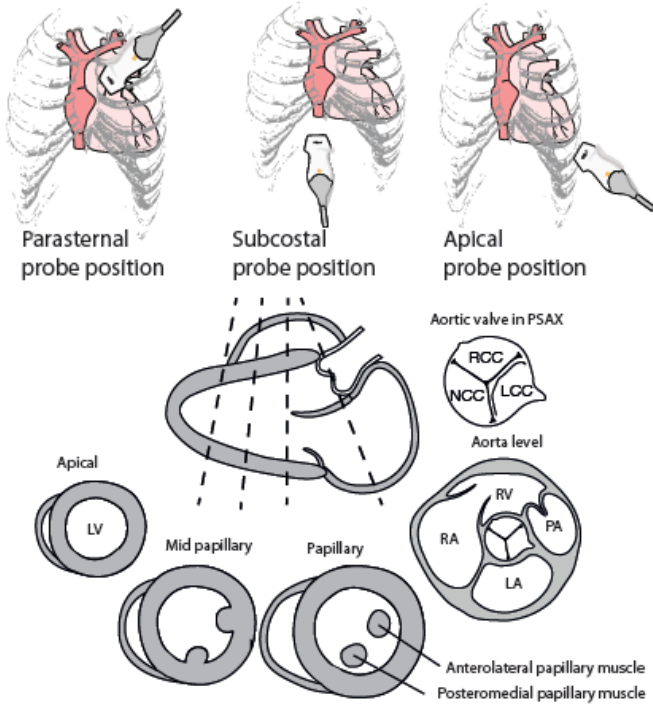
FOCUS protocol

- ▶ Time critical scenarios (Trauma/ cardiac arrest).
- ▶ Rapid detection of significant Cardiac pathology/volume status.
- ▶ Biventricular function.

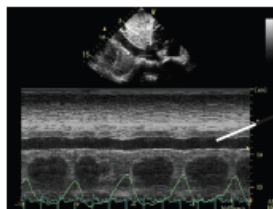
Trans-Thoracic Echocardiography in ICU

Concerns	Views
LV systolic function	Parasternal long axis short axis view, 2, 3 and 4-chamber view
Cardiac output	4-chamber view
Right heart assessment	Parasternal long axis short axis view, 4-chamber view
Pericardial disease	Parasternal long axis short axis view, 4-chamber view, subcostal view
Valvular disease	Parasternal long axis short axis view, 4-chamber view
Volume status and responsiveness	4-chamber view, inferior vena cava

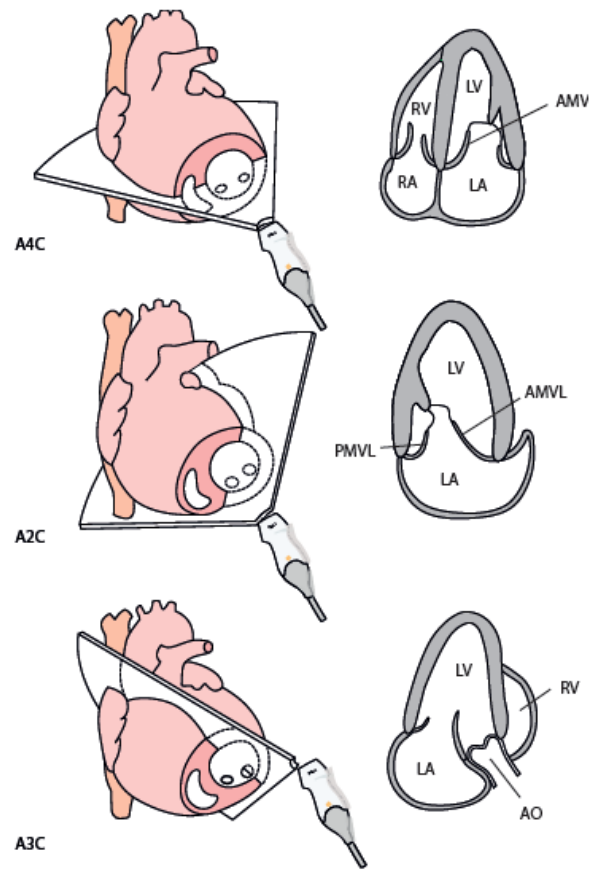
STANDARD PARASTERNAL TTE VIEWS



SUBCOSTAL VIEW



STANDARD APICAL TTE VIEWS



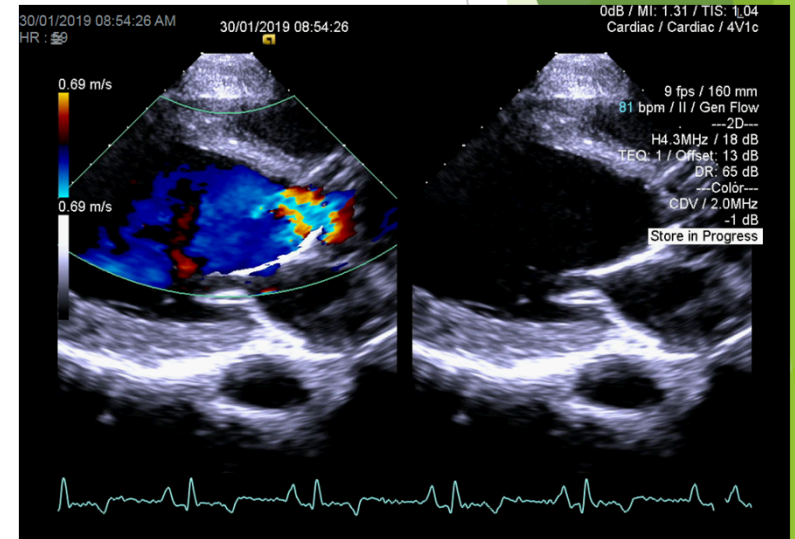
Mandatory views

Trans-thoracic echocardiography

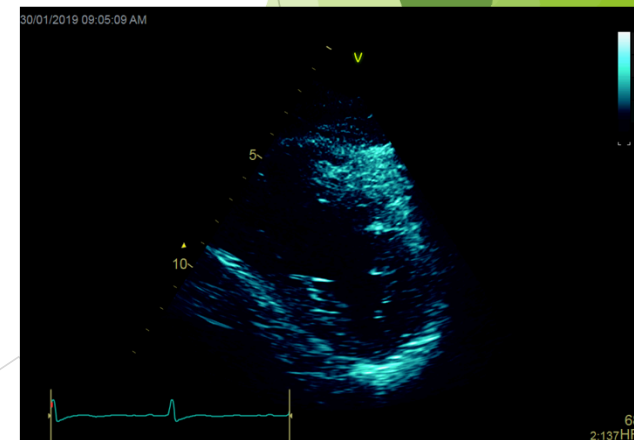
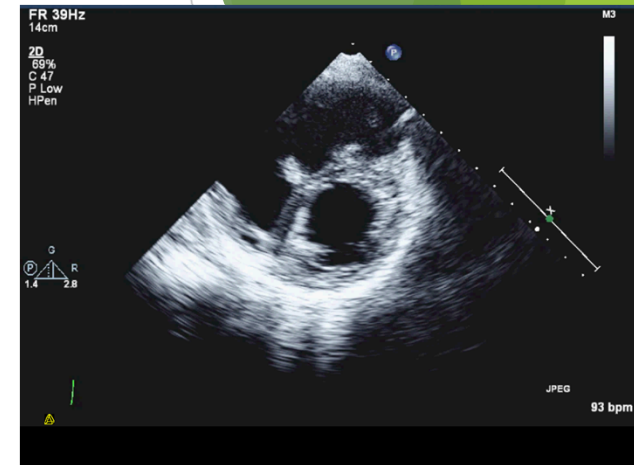
- ▶ Parasternal long axis.
- ▶ Parasternal short axis.
- ▶ Apical 4 chambers.
- ▶ Subcostal 4 chambers.
- ▶ Subcostal IVC.



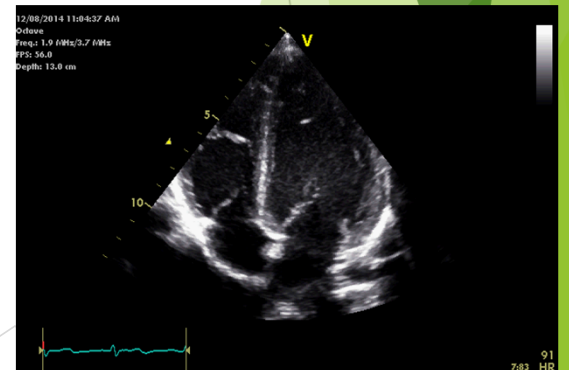
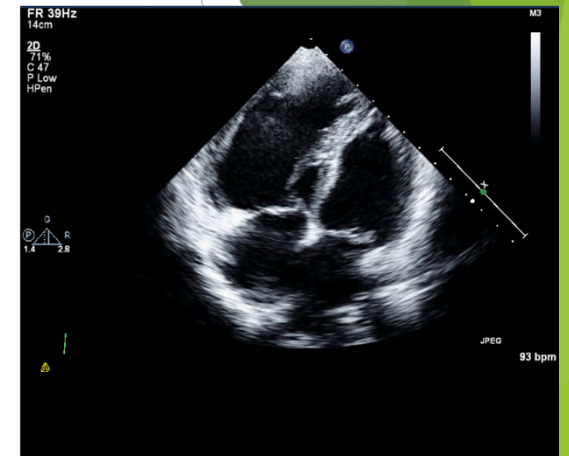
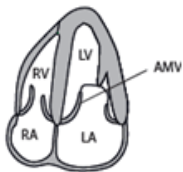
Parasternal long axis



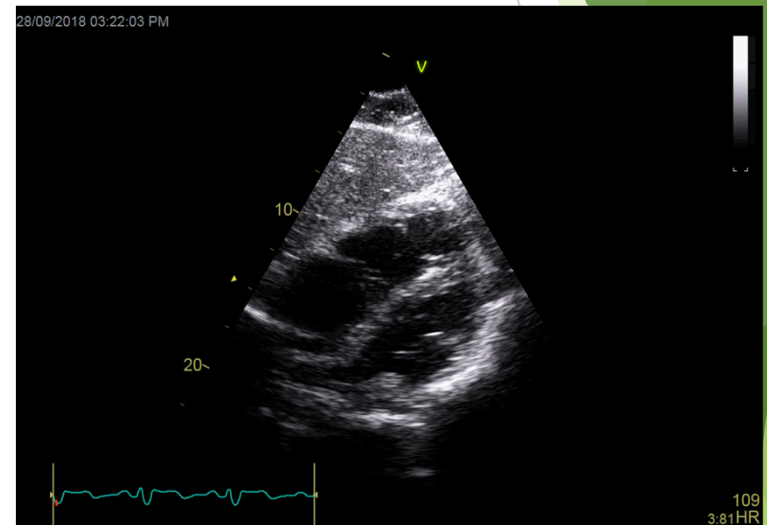
Parasternal short axis



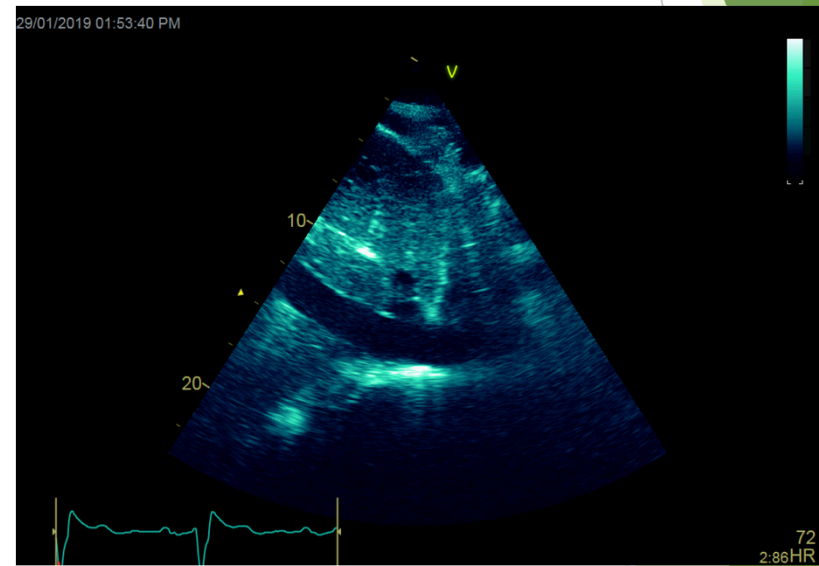
Apical 4 chambers



Subcostal 4 chambers



Subcostal IVC




Trans-esophageal echocardiography

- ▶ Suboptimal TTE images.
- ▶ Structural not assessable by TTE.
 - Thoracic Aorta
 - LAA
- ▶ When the TTE does not answer the clinical question.
 - IE.
 - Mechanism of valvular abnormality



Transesophageal Echocardiography

Nomenclature: ASE/SCA

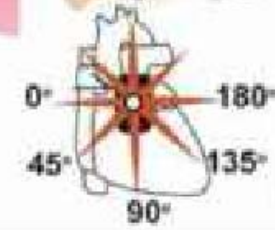


Upper Esophageal (UE) views
(20 - 25 cm)

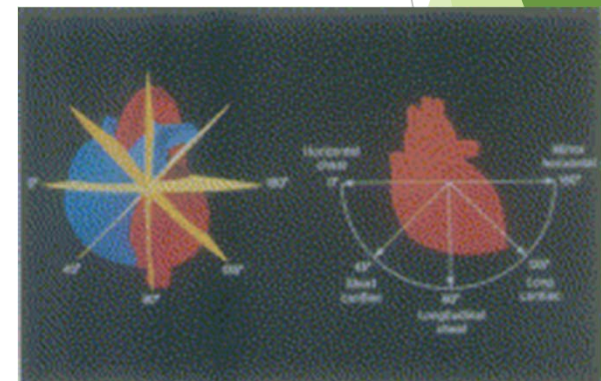
Transgastric (TG) views
(40 - 45 cm)

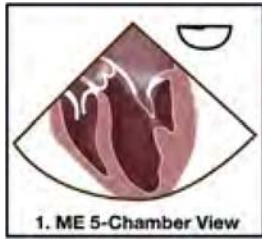
Mid Esophageal (ME) views
(30 - 40 cm)

Deep Transgastric (TG) views
(45 - 50 cm)

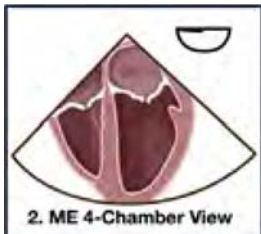


Multiplanar Examination





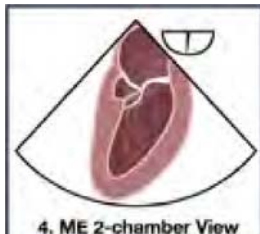
1. ME 5-Chamber View



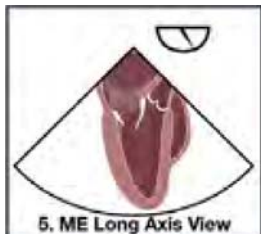
2. ME 4-Chamber View



3. ME Mitral Commissural View



4. ME 2-chamber View



5. ME Long Axis View



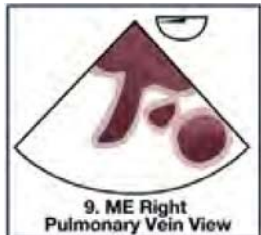
6. ME AV LAX View



7. ME Ascending Aorta LAX View



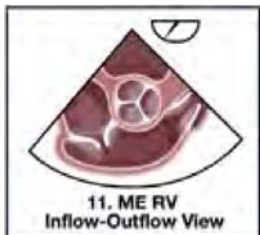
8. ME Ascending Aorta SAX View



9. ME Right Pulmonary Vein View



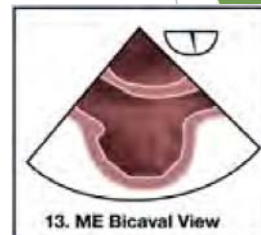
10. ME AV SAX View



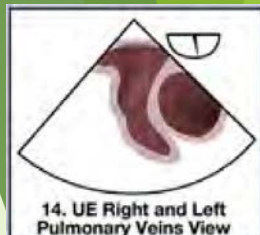
11. ME RV Inflow-Outflow View



12. ME Modified Bicaval TV View



13. ME Bicaval View



14. UE Right and Left Pulmonary Veins View



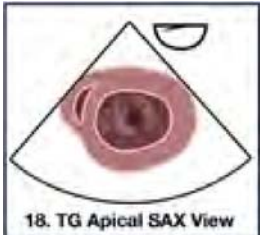
15. ME Left Atrial Appendage View



16. TG Basal SAX View



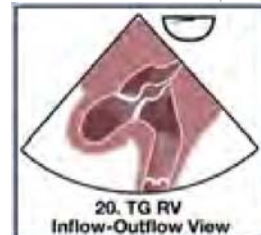
17. TG Mid Papillary SAX View



18. TG Apical SAX View



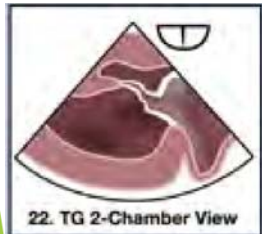
19. TG RV Basal View



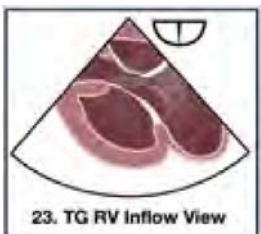
20. TG RV Inflow-Outflow View



21. Deep TG 5-chamber View



22. TG 2-Chamber View



23. TG RV Inflow View



24. TG LAX View



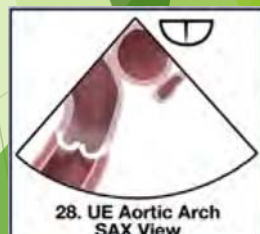
25. Descending Aorta SAX View



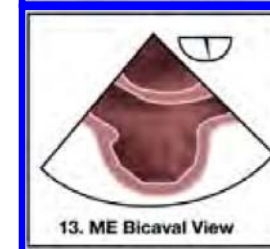
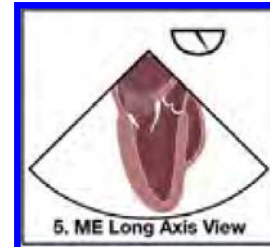
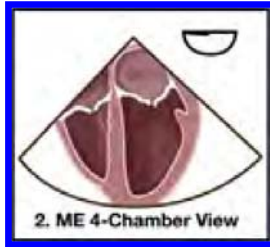
26. Descending Aorta LAX View

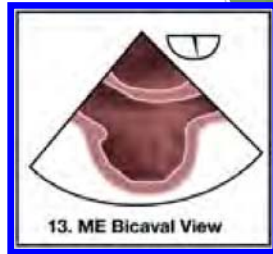
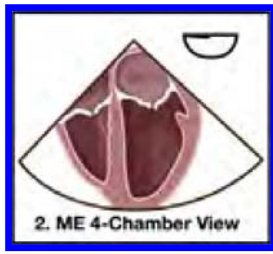


27. UE Aortic Arch LAX View

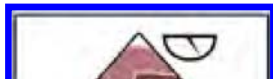


28. UE Aortic Arch SAX View





Mid-esophageal

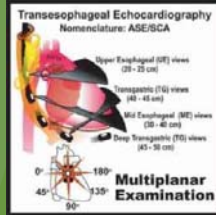
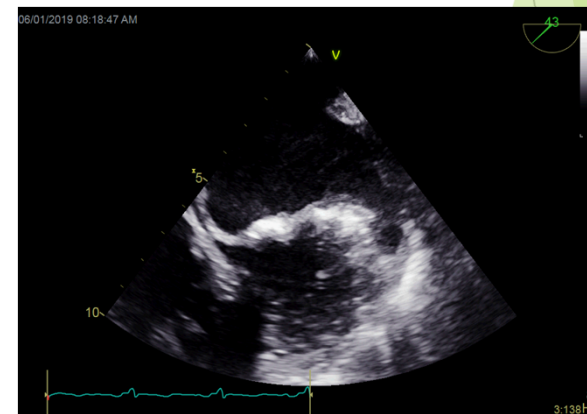
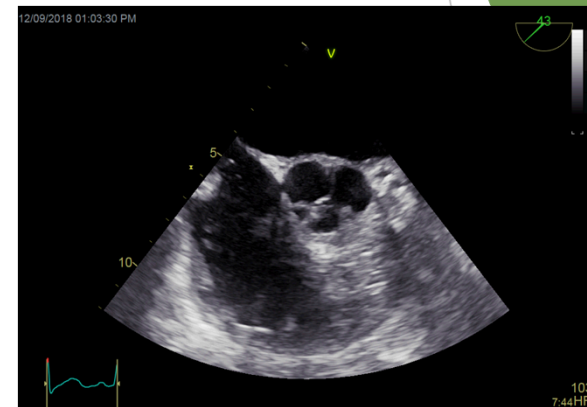
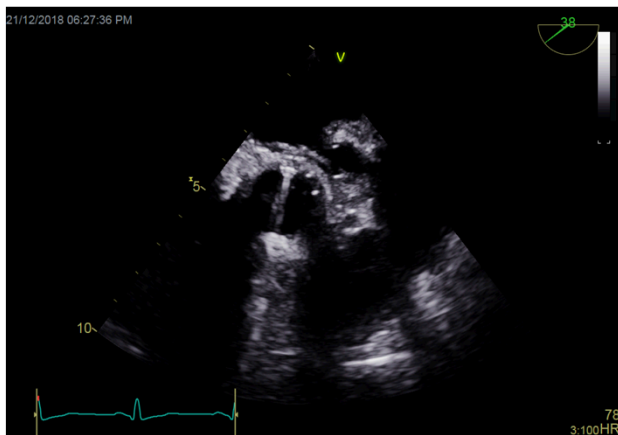
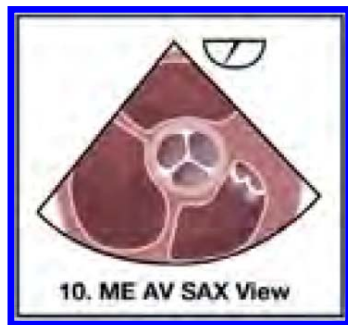


Mandatory TEE views

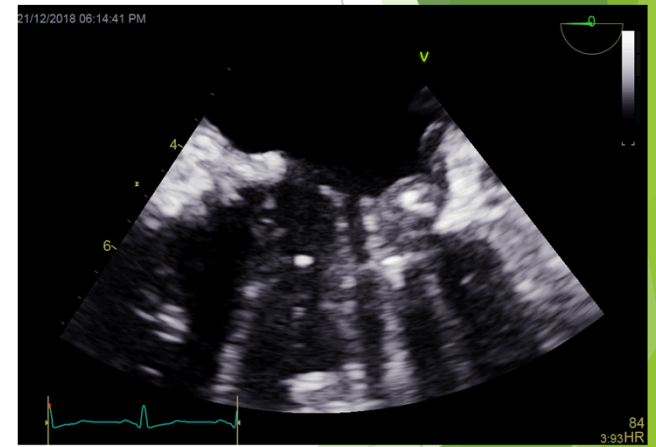
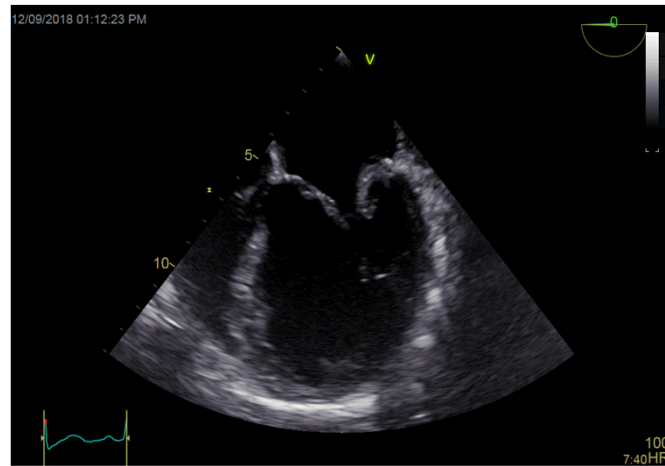
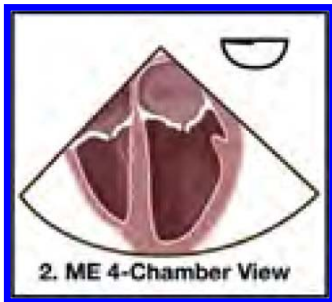
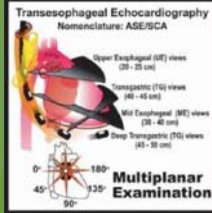


Aortic

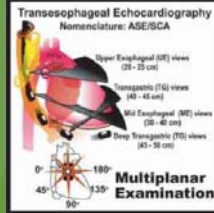
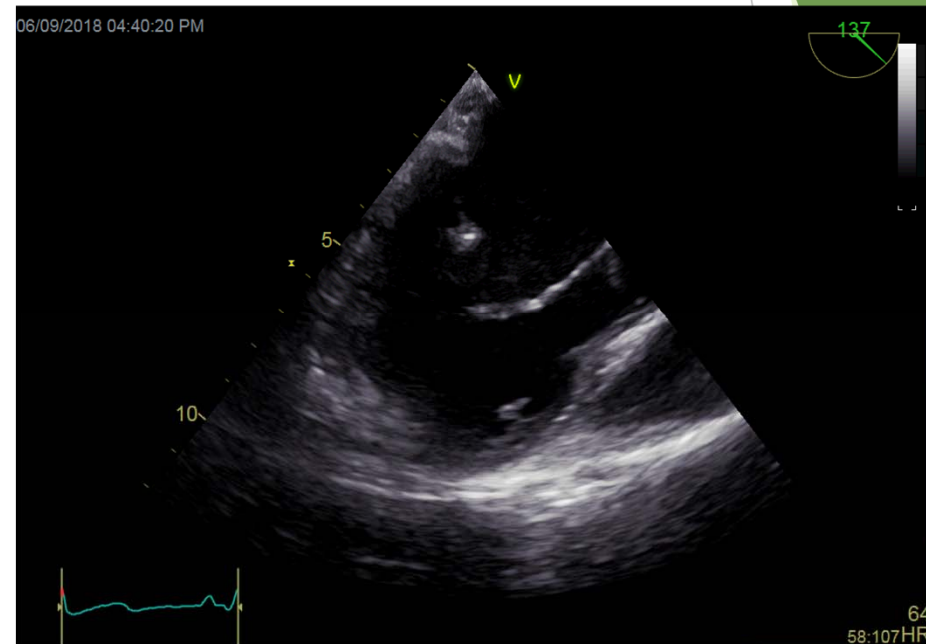
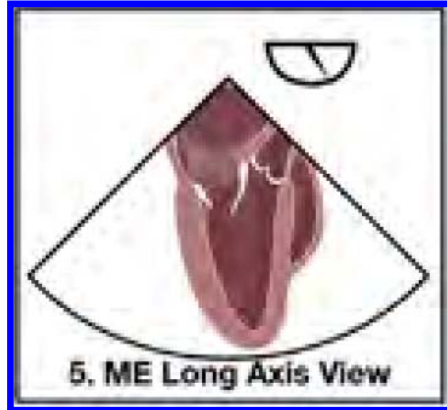
Mid-esophageal SAX view



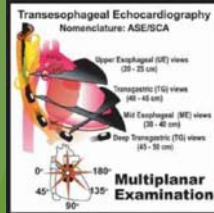
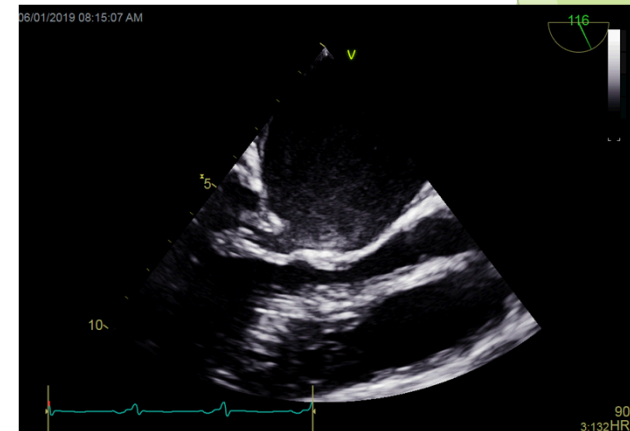
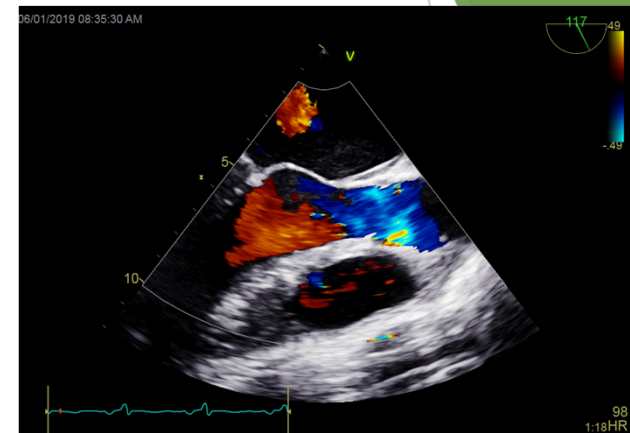
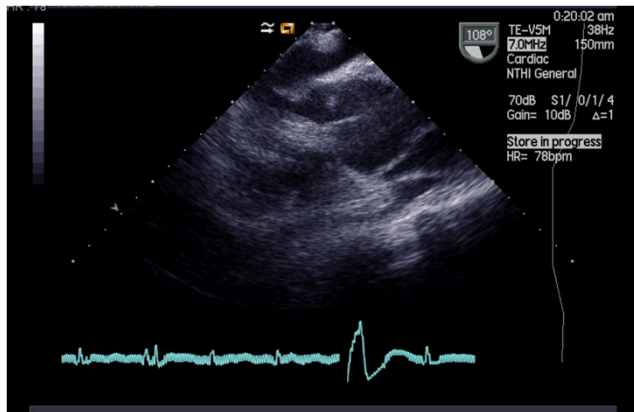
Mid-esophageal 4ch view



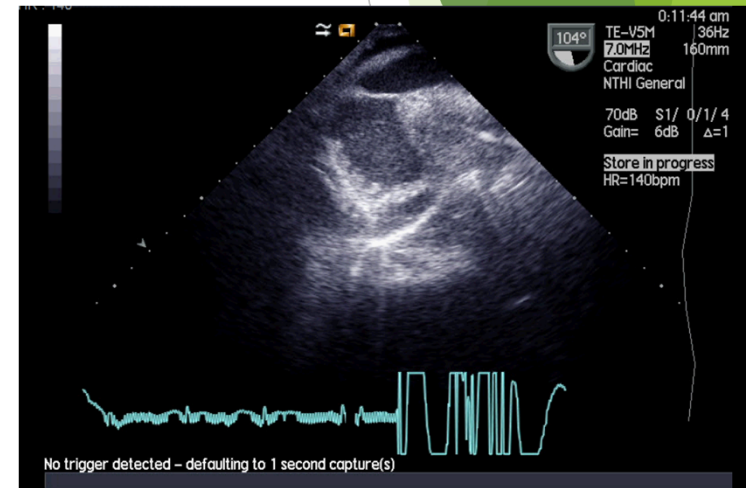
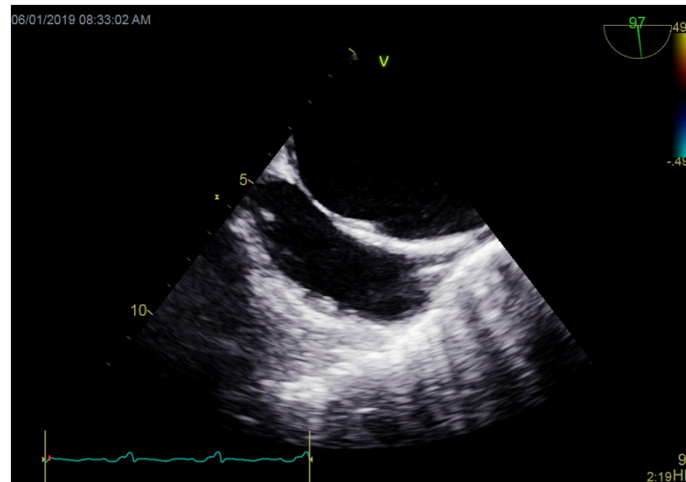
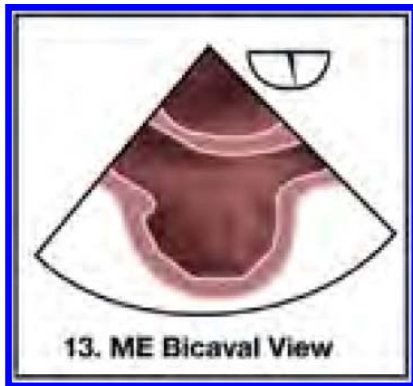
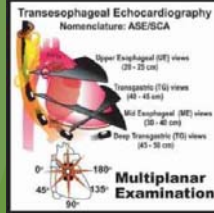
Mid-esophageal LAX view



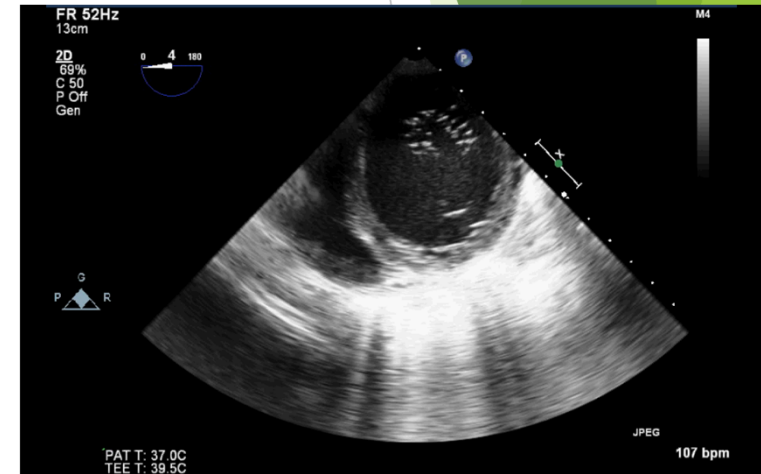
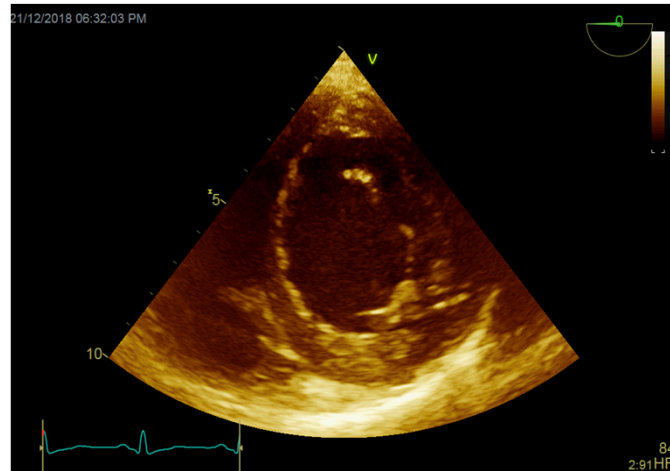
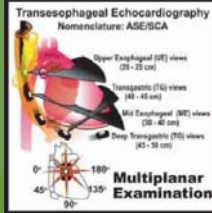
Mid-esophageal LAX view



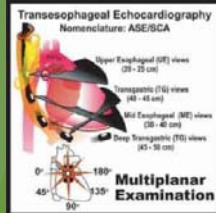
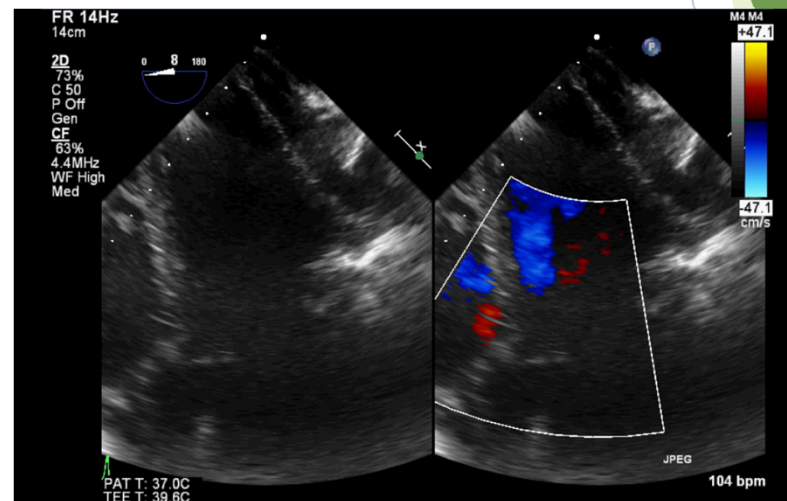
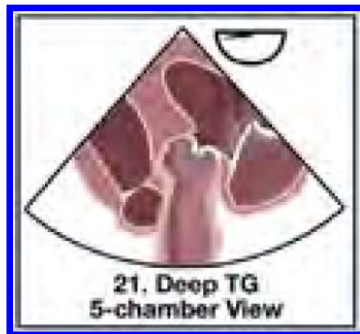
Mid-esophageal bicaval view



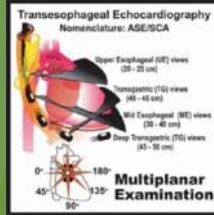
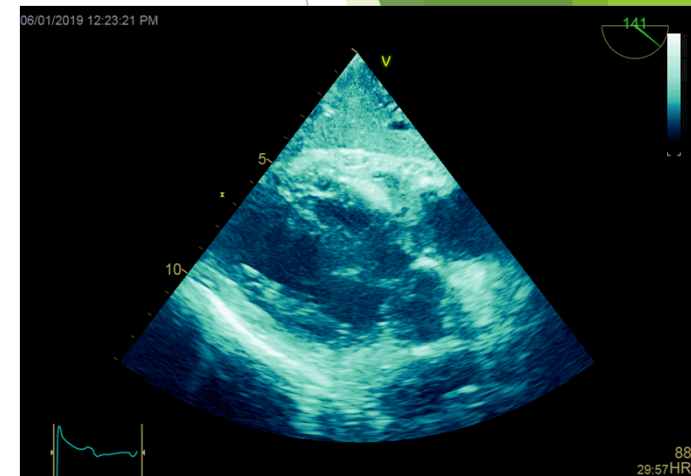
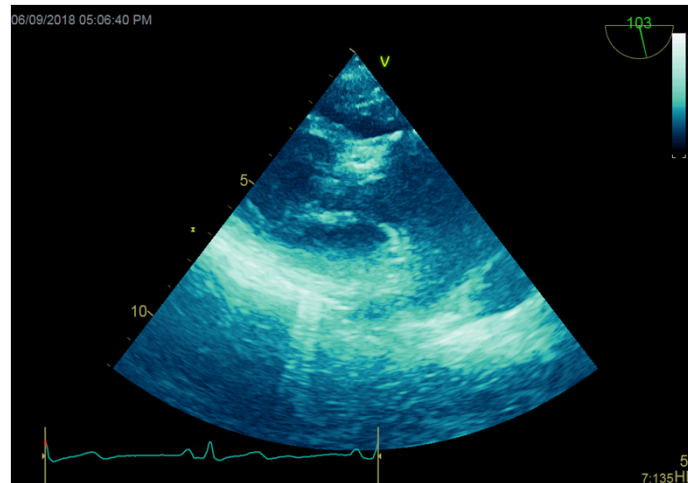
Trans-gastric SAX view PM



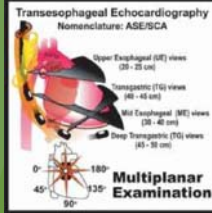
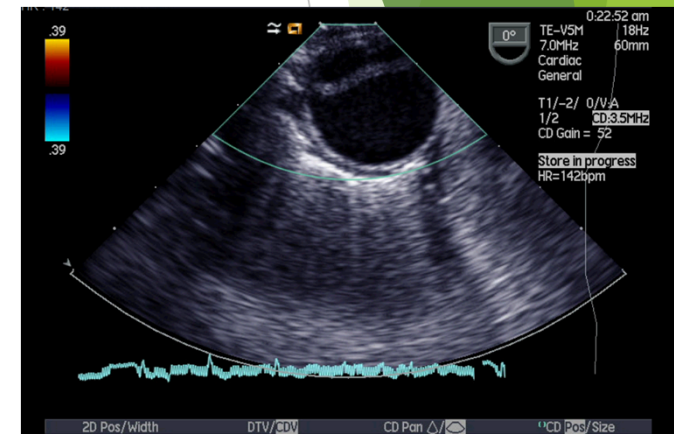
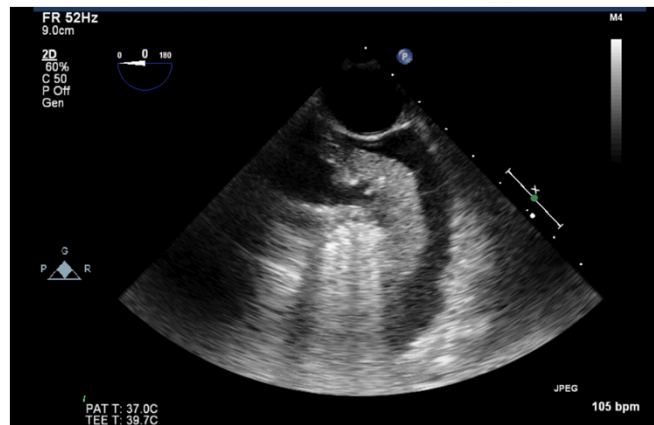
Deep trans-gastric view



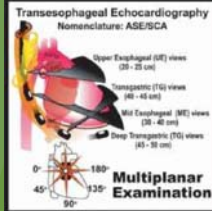
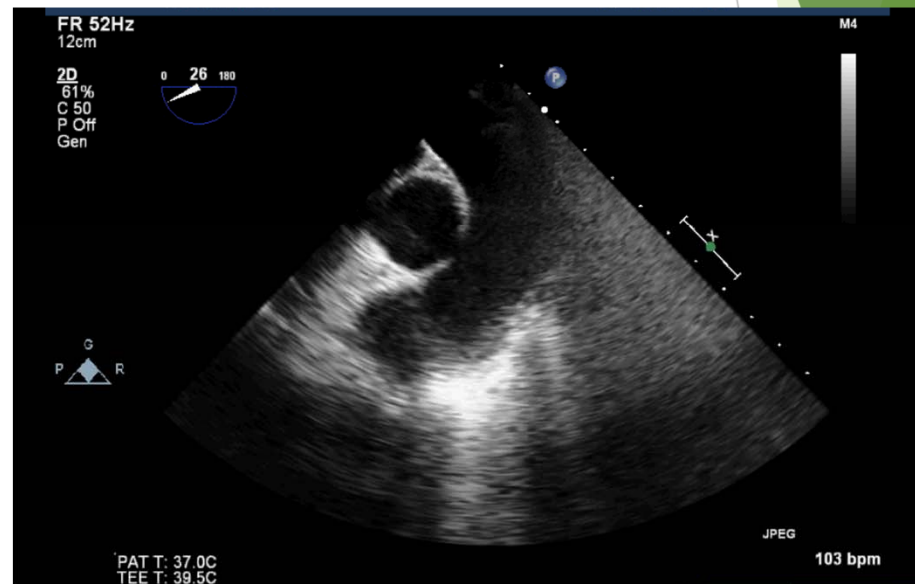
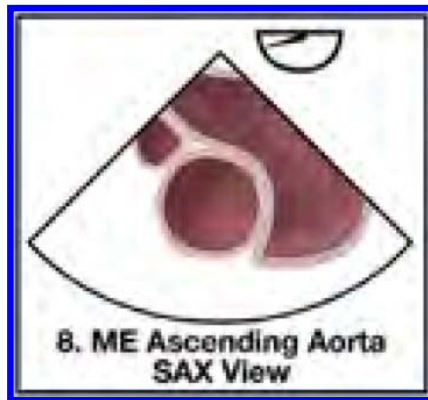
Trans-gastric LAX view



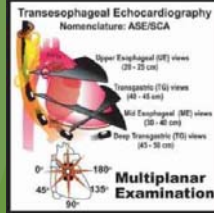
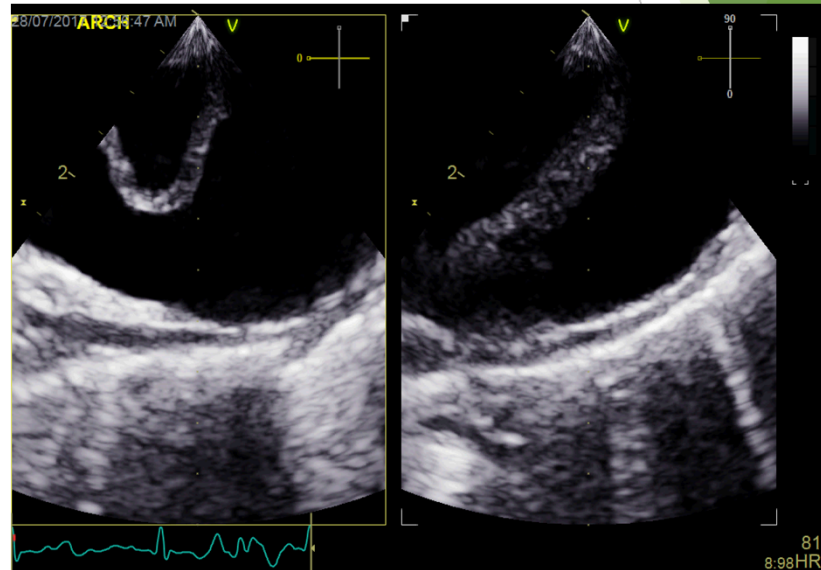
Descending Ao. SAX view



Upper-esophageal Ascending Ao. SAX view



Upper-esophageal SAX view Ao. arch



Conclusion

- ▶ Echocardiography (TTE/TEE) is an important tool in intensivist hand.
- ▶ He just should know how to use it.
- ▶ We just tried implement basic TTE/TEE views facilitating his training; leading to improve patient care.



Thank You

