# TEE

2 augustus 2012
AIOS onderwijs
Eric Wierda
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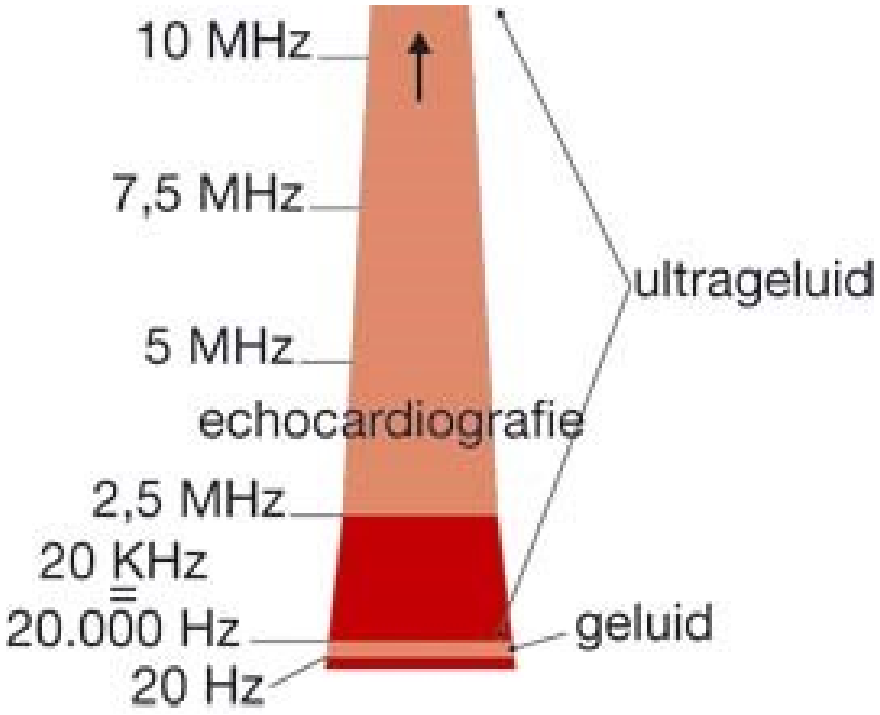
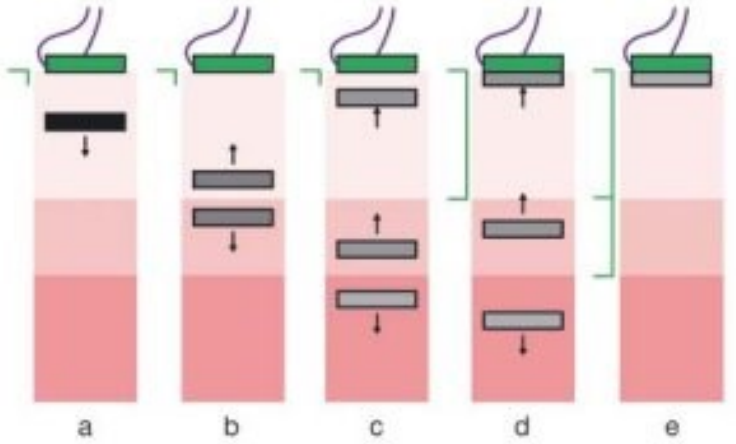
# Techniek


10 MHz
7,5 MHz
5 MHz
echocardiografie
2,5 MHz
20 KHz
20.000 Hz
20 Hz
ultrageluid
geluid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# Esophageal Echocardiography

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Leon Frazin, M.D., James V. Talano, M.D., Leo Stephanides, M.S.,
Henry S. Loeb, M.D., Leroy Kopel, M.S., and Rolf M. Gunnar, M.D.

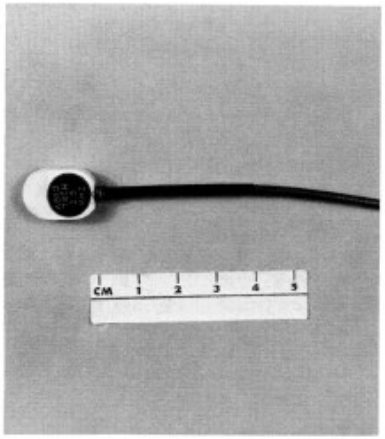



Figure 1. *Photograph of esophageal 3.5 MHz nonfocused transducer.*

## Method

A 9 mm nonfocused Aerotech 3.5 MHz transducer was designed and instrumented to permit easy swallowing by adults (fig. 1). The transducer is placed in a 1.9 cm × 1.3 cm × 0.6 cm casing with rounded edges for easy esophageal passage. Its blunt end is attached to a calibrated 3 mm coaxial cable which permits sufficient control of rotation at 30–40 cm length, the level of cardiac echoes.

Prior to the study, subjects were fasted. After gargling 20 cc of 2% viscous xylocaine, they swallowed the transducer. Subjects usually fed the transducer to themselves. Most found the procedure innocuous, but three of the 38 subjects did complain of discomfort. No complications were encountered. Cardiac echoes were easily obtained, and the entire procedure required approximately 10 minutes. The transducer's position was identified by the aortic root echo. From this position, advancement and a small degree of left lateral rotation were used to scan the anterior mitral valve leaflet. Esophageal echoes were obtained in sitting and supine positions, and recorded on standard echocardiographic equipment. Figure 2 shows a PA and lateral chest X-ray of the esophageal transducer in place.

# Indicaties

- Onvoldoende kwaliteit beelden TTE voor beantwoording vraagstelling
- Cardiale emboliebron
- Pre-operatief (klepanalyse), peri-operatief (TAVI)
- Endocarditis

# Contra-indicaties

- Absoluut
  - Oesofagus
    - Obstructie
    - Divertikel, laceratie, fistel
  - Actieve maag- of oesofagusbloeding
  - Niet nuchter ( < 4 uur)
  - Allergie lidocaine / midazolam

# Contra-indicaties

- Relatief
  - Oesofagitis
  - Oesofagusvarices
  - Recente maagchirurgie
  - Maagulcus
  - Hiatus hernia
  - Aandoening cervicale wervelkolom met beperkte flexie
  - Dysmorfie gebit/mond-keelholte met bemoeilijkte passage
  - Verhoogde bloedingsneiging
    - Trombocytopenie < 50, INR > 4

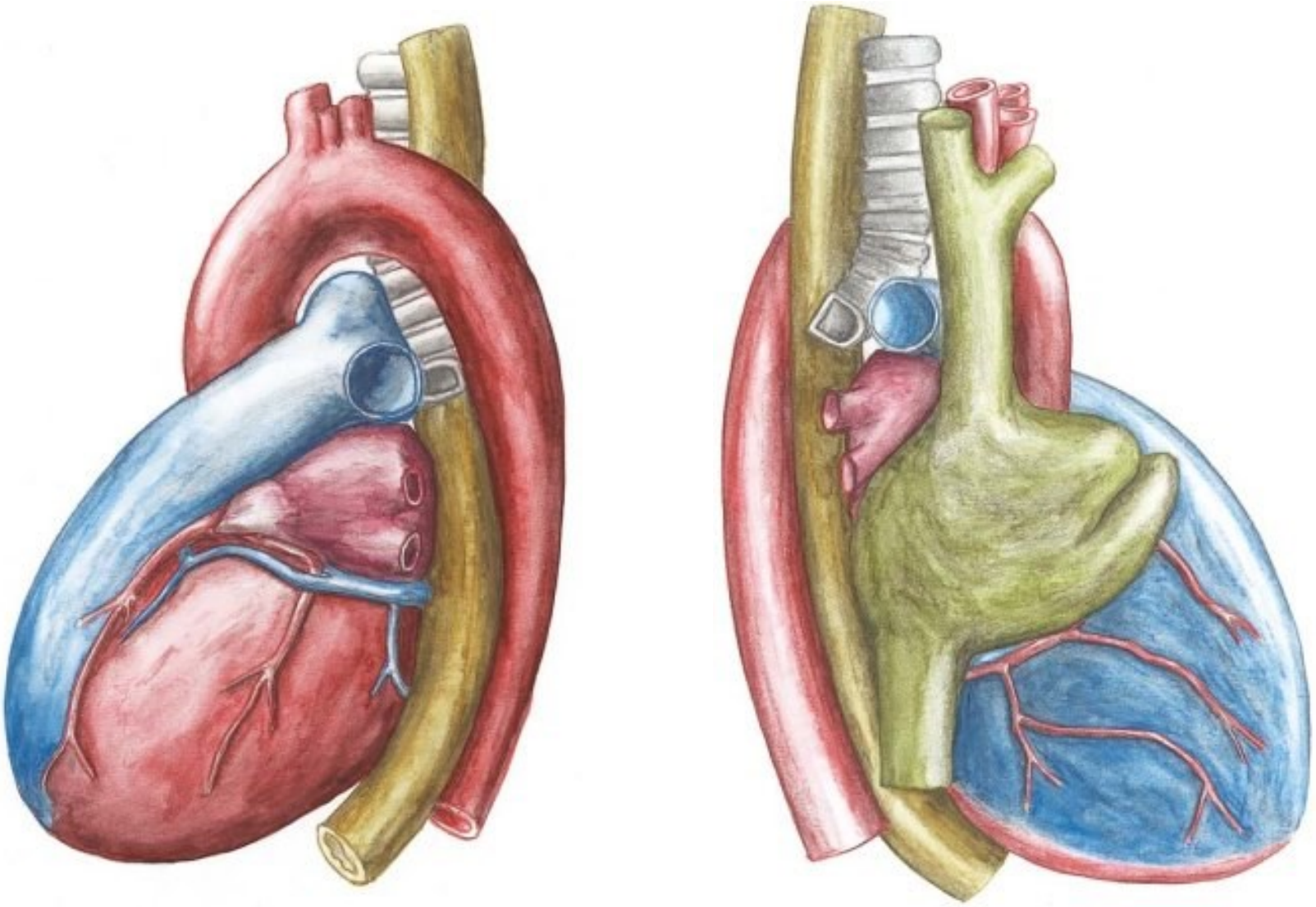
# Complicaties

- Introductie
  - Trauma mond-keelholte
  - Vagale reactie
- Algemeen
  - Laryngospasme
  - Aritmie
  - Oesofagusperforatie (n=3/10.000 = 0,03%)
  - Overlijden (n=4/40.000 = 0,01%)
- Gastroscopie: mortaliteit 0,01%/perforatie 0,03%

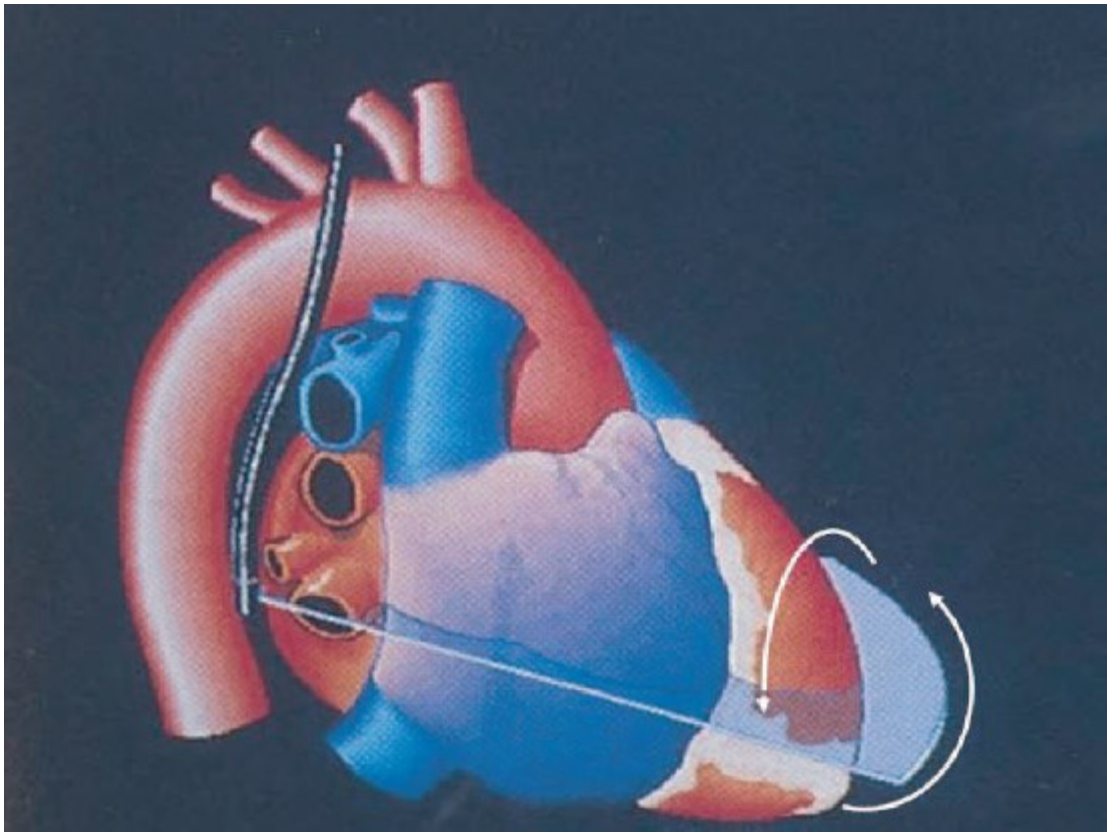
# Probe

- Draaiing
- Plane rotation (graden)
- Anteflexie/retroflexie
- Sideward flexion

# Anatomie



# Anatomie



# Voorbereiding

- Gel in beschermhoes voor probe
  - Impermeabel voor micro-organismen
  - Tip luchtvrij
- Mondbit, kunstgebit verwijderen
- Lidocainegel op probe
- Uitleg patient
  - Na onderzoek 1 uur niet eten/drinken, daarna water
  - Na 1 dag nog klachten: contact afdeling
- Eventueel midazolam
  - O2, SpO2, RR, short stay verkoever

# Verslaglegging

- Introductie probe
- Atriale septum
- LAA
- Kleppen
  - Aortaklep
  - Mitralisklep
  - Tricuspidalisklep
- Aorta thoracalis

# Opnames

- EAE update 2010
  - Transoesofageaal
  - Transgastrisch
  - Aorta

- Duur afhankelijk van tolerantie patiënt en vraagstelling

# Transoesofageaal

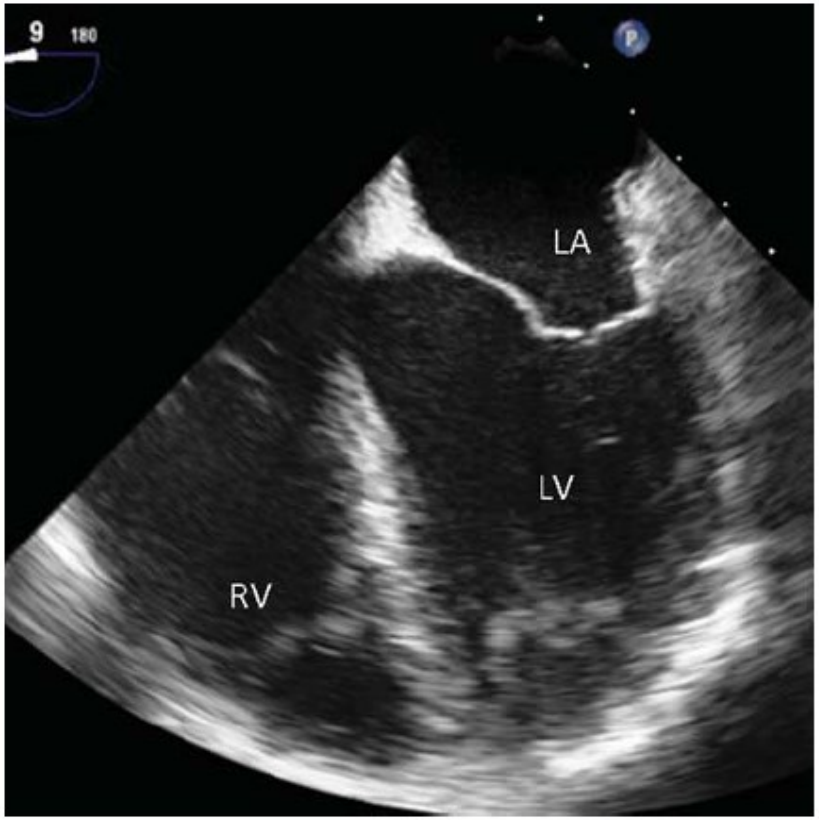



**Figure 2** Transoesophageal four-chamber view. LA, left atrium.

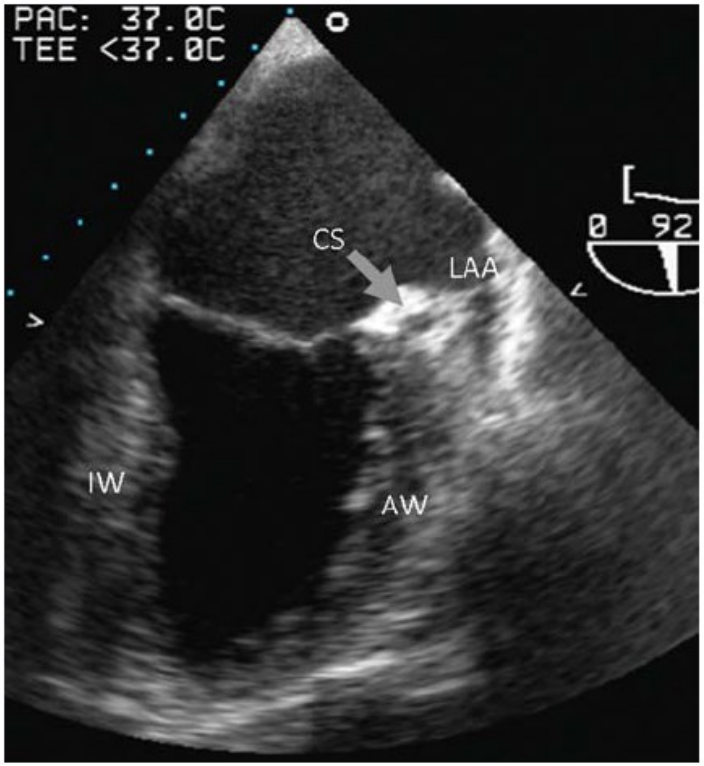



**Figure 3** Transoesophageal two-chamber view. AW, anterior wall; IW, inferior wall; LAA, left atrial appendage; CS, coronary sinus.

# Transgastrisch

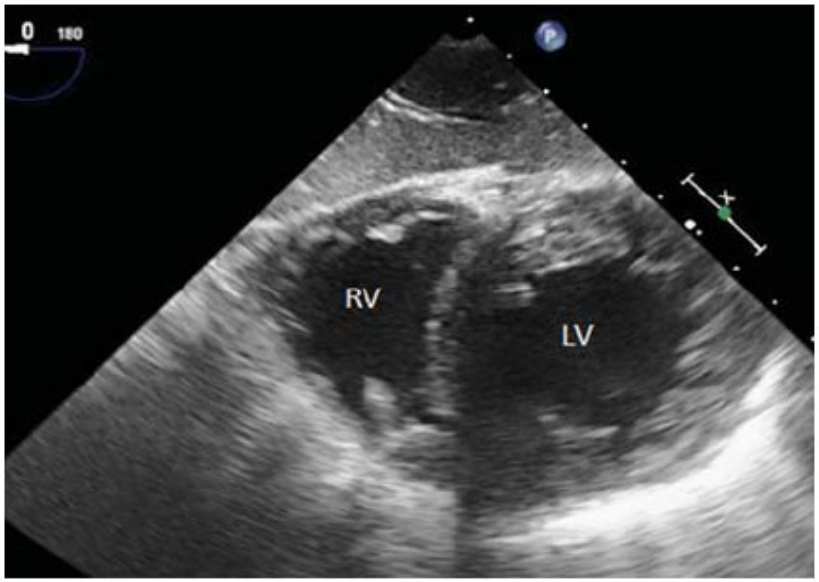



**Figure 13** Transgastric short-axis view of the left (LV) and right ventricle (RV).

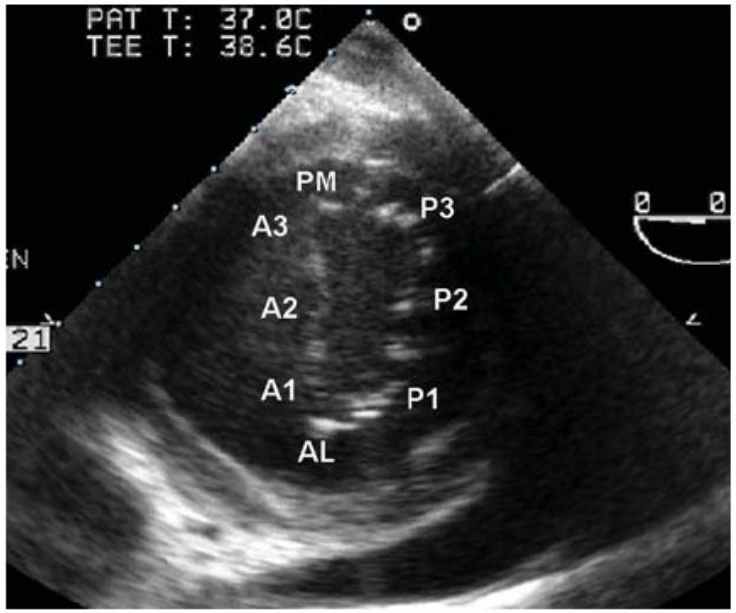



**Figure 17** Short-axis view of the open mitral valve from the transgastric position. AL, anterolateral; PM, posteromedial commissure. A1–A3 and P1–P3 denominate the respective leaflet scallops.

# Mitralisklep

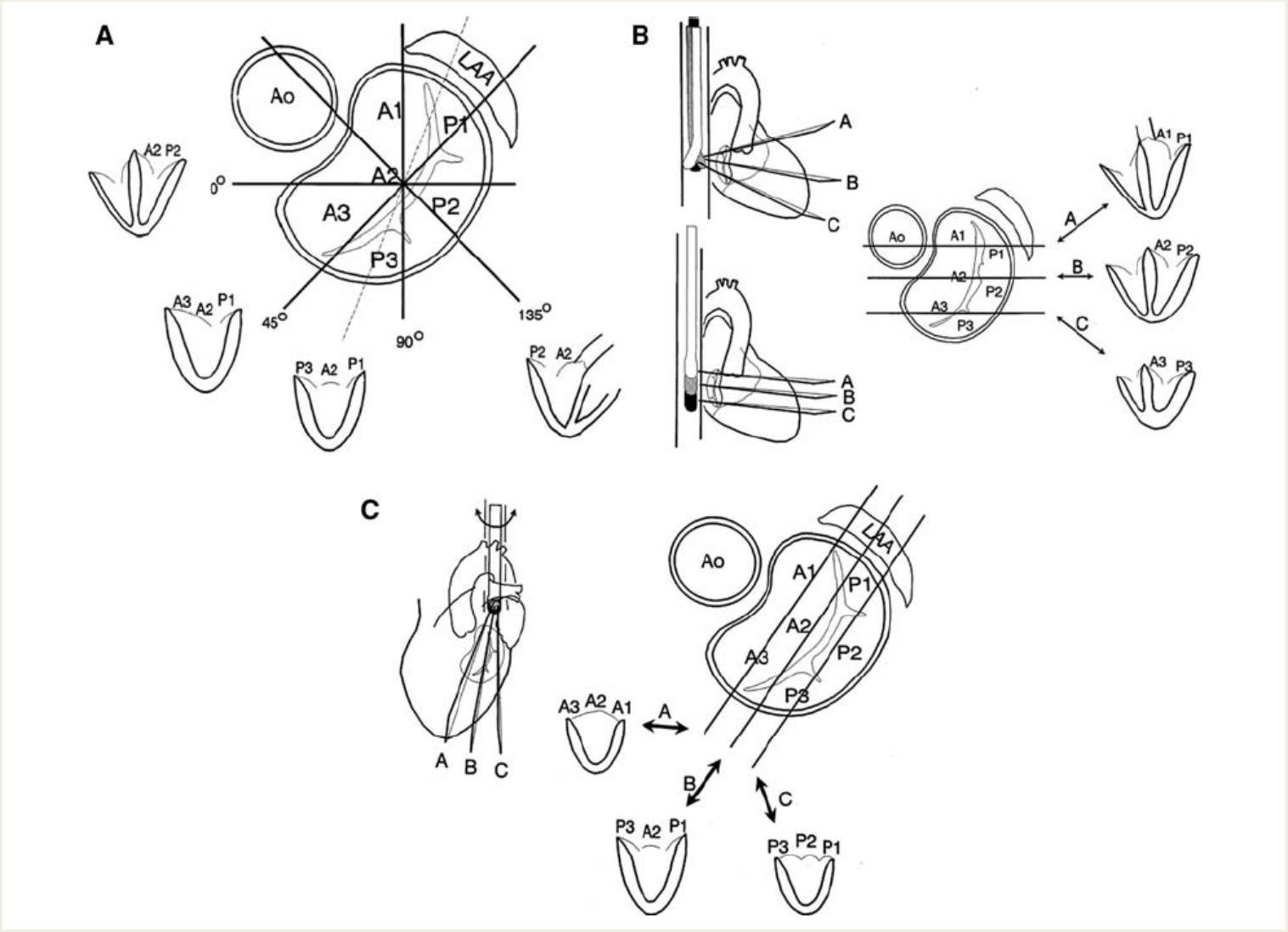



**Figure 20** Examination of the mitral valve. Screen depiction of relative position of mitral leaflets and segments/scallops in typical transoesophageal cross-sections created by three different examination manoeuvres. Note that individual anatomy, especially scallop morphology, is variable, and so is the relation of image plane orientation to individual anatomy; the schematic drawings should therefore be understood as approximations. A1–A3, anterior leaflet segments; P1–P3, posterior leaflet segments; Ao, aortic valve; LAA, left atrial appendage. (*A*) Examination by rotation of imaging cross-section with fixed transducer position positioned at the level of the mitral valve centre. (*B*) Examination by flexion/withdrawal and retroflexion/advancement of the transesophageal transducer, while rotation angle is fixed in a transverse orientation (0°). (*C*) Examination by probe shaft rotation (counterclockwise from plane A to C), while rotation angle is fixed in an orientation approximating the mitral closure line (45–90°). Note that the aortic valve is not imaged in these planes. Reproduced, with permission, from Foster *et al.*[47]

# Aorta(klep)

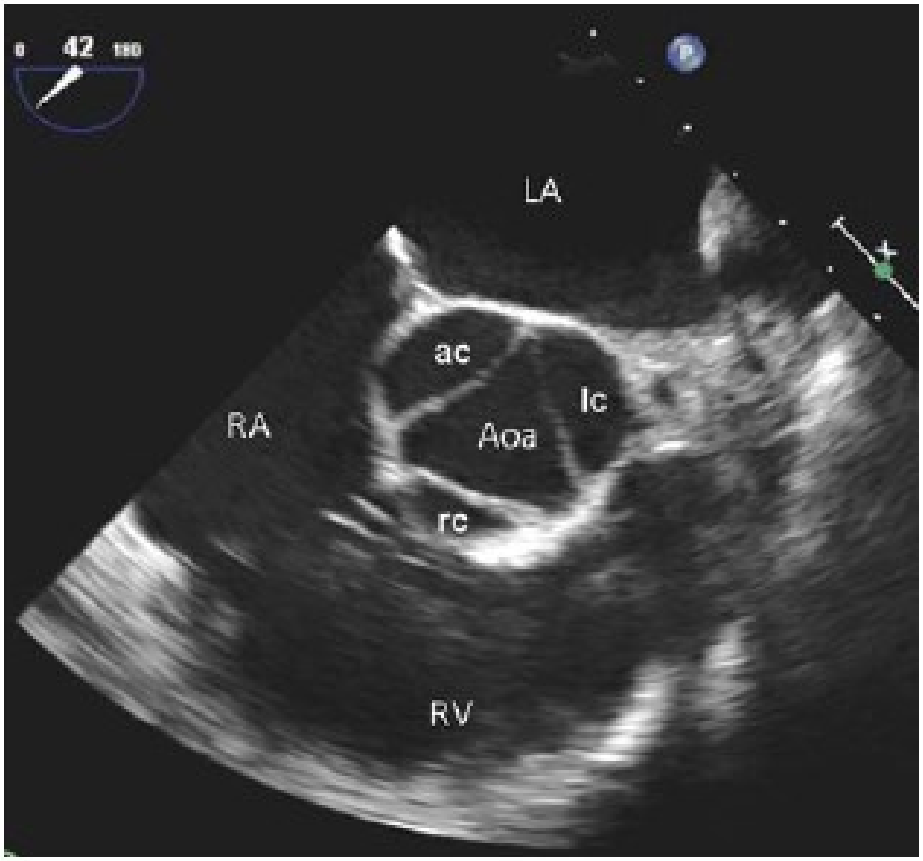



**Figure 5** Aortic valve short-axis view (ac, acoronary; lc, left coronary; rc, right coronary cusp and sinus).

# Aorta(klep)

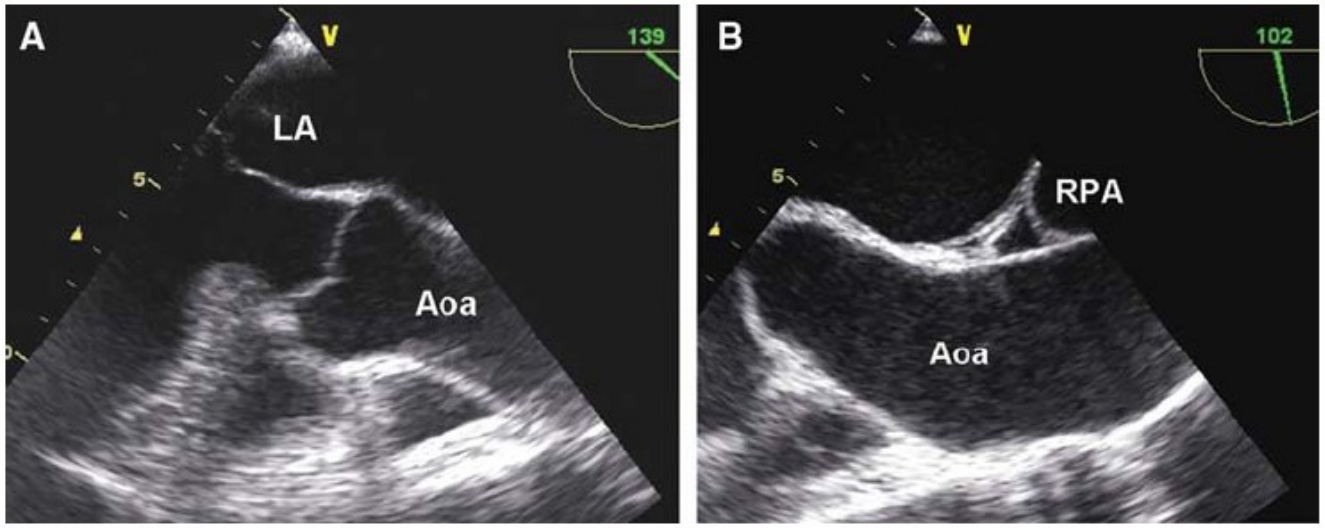



**Figure 7** Long-axis view of the ascending aorta. (*A*) Proximal ascending aorta. (*B*) In the same patient, after retraction of the probe and adjustment of the plane orientation, a long portion of the dilated ascending aorta is seen. RPA, right pulmonary artery.

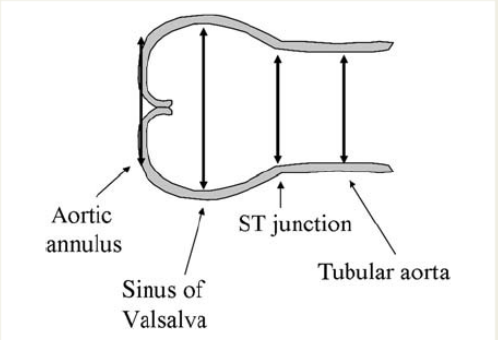



**Figure 24** Typical measurements of the aortic root apparatus. ST, sinotubular.

# Aorta(klep)

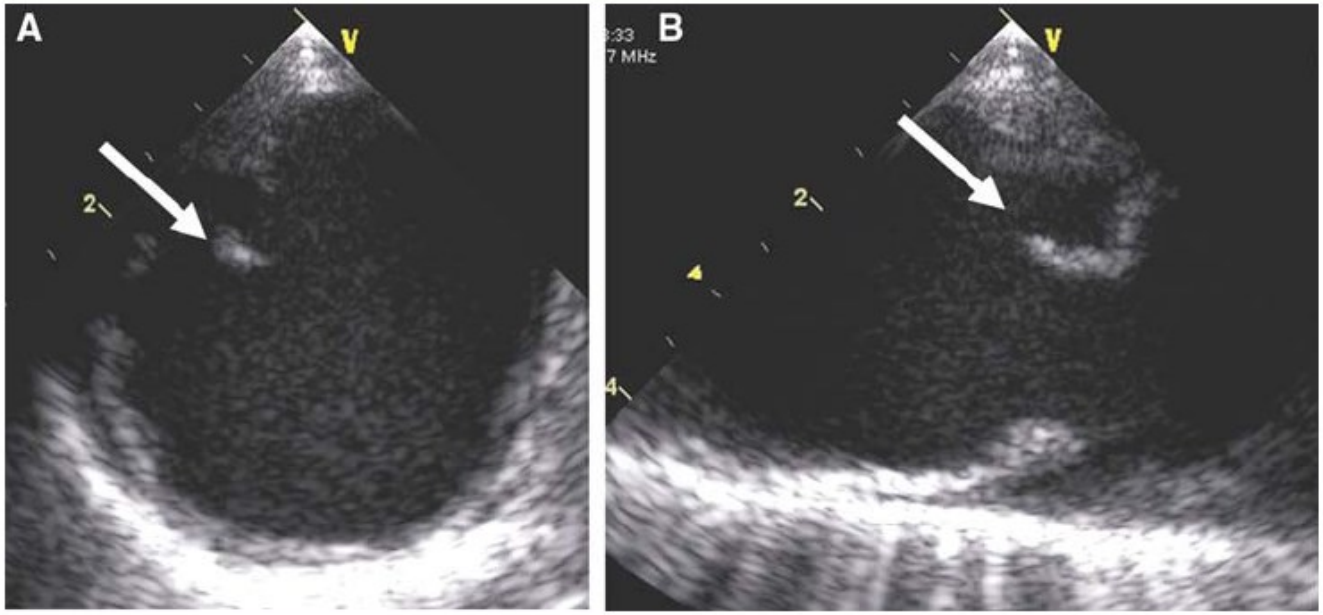



**Figure 18** Descending aorta: (*A*) short-axis view; (*B*) long-axis view. The aorta shows atherosclerotic lesions, some of which (arrow) have superimposed mobile thrombus.

# Cardiale emboliebron 2

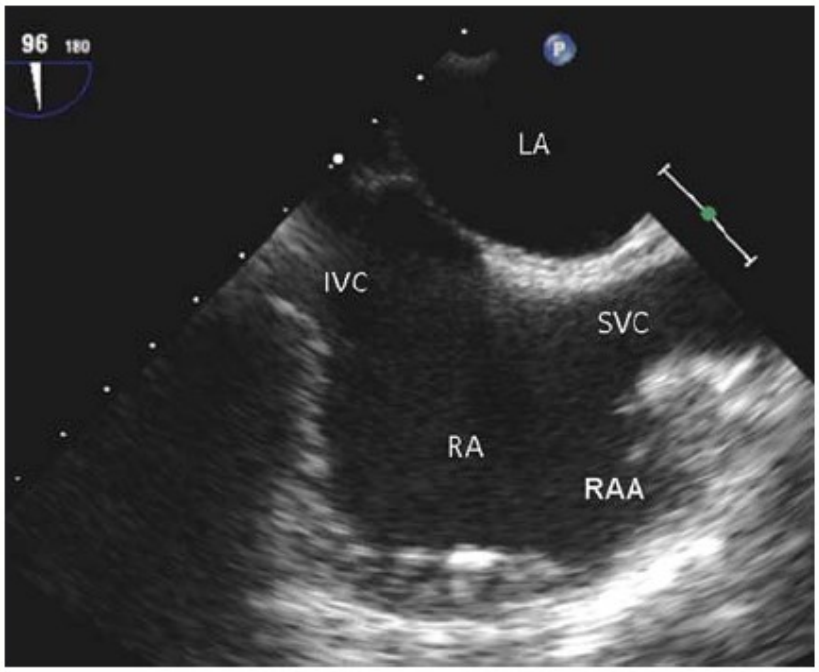



**Figure 8** Left and right atrium and atrial septum in longitudinal (sagittal) view. Note orifice of superior (SVC) and inferior vena cava (IVC) and right atrial appendage (RAA).

# Cardiale emboliebron

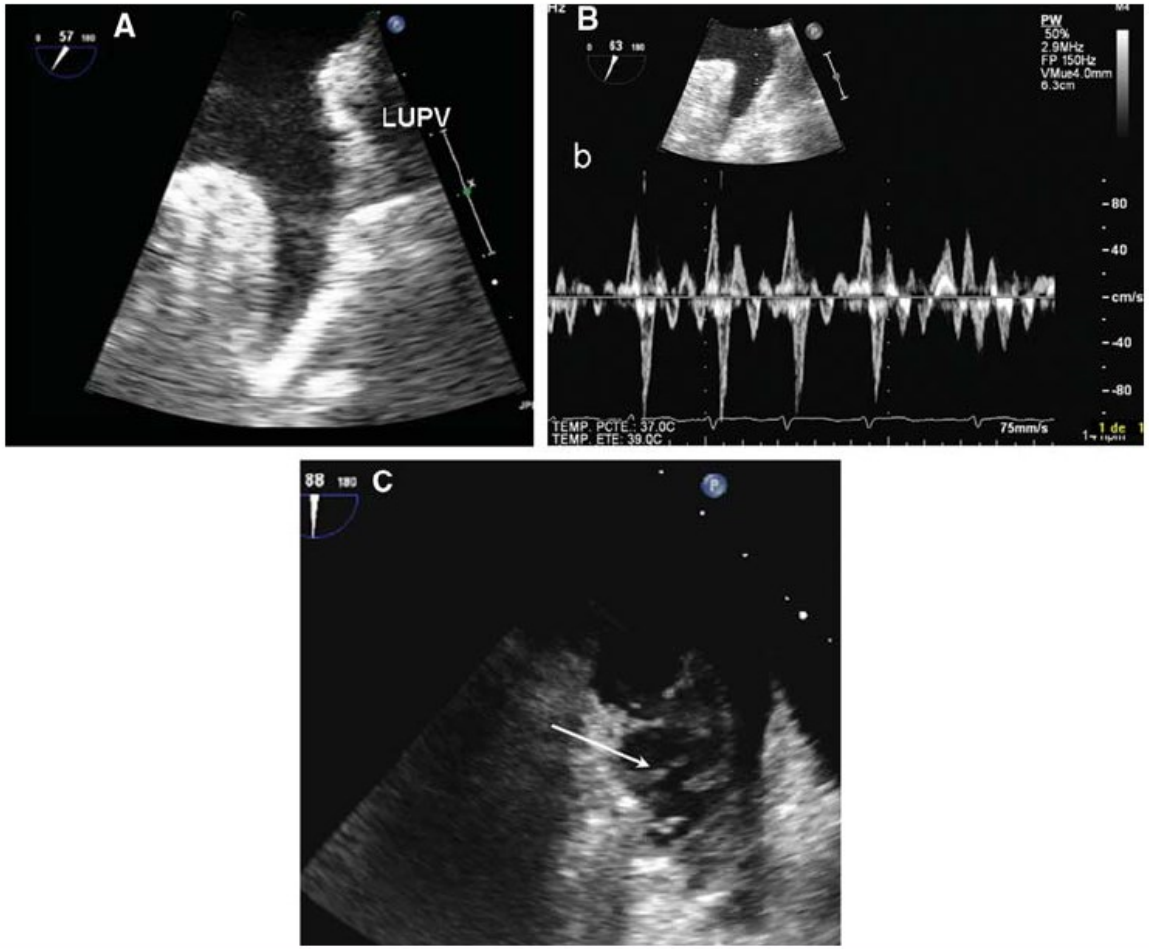


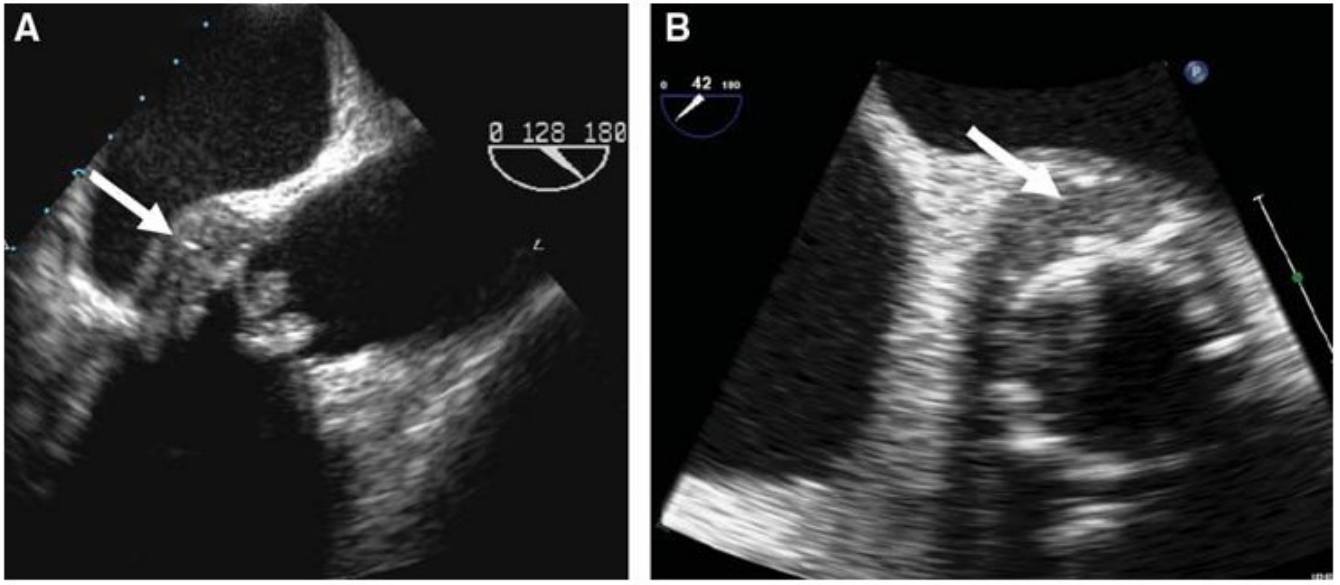

**Figure 9** (*A*) Left atrial appendage. (*B*) Pulsed wave Doppler recording of emptying (upward) and filling (downward) velocities in atrial fibrillation. The velocities are quite high (>25 cm/s), indicating relatively low risk of thrombus generation. LUPV, left upper pulmonary vein. (*C*) Example of left atrial appendage with marked pectinate muscles (arrow). There is no thrombus.

# Virtueel

- http://pie.med.utoronto.ca/TEE/index.htm

# Toekomst

# Voorbeelden kliniek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B
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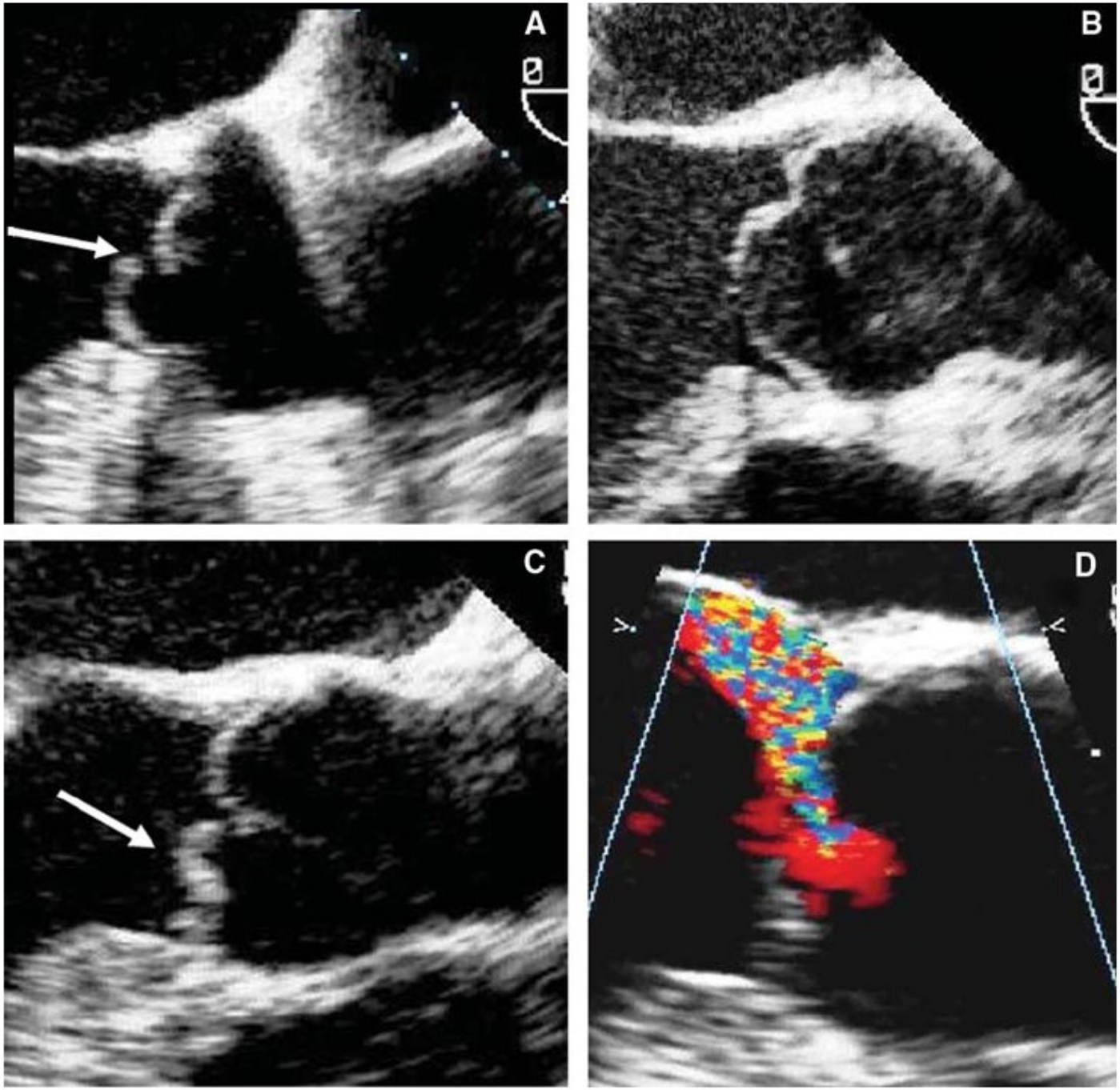
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# Take home

- Bij goede indicatie is TEE geschikt onderzoek, mn bij MI, vegataties en CEB
- Zo weinig mogelijk sedatie!
- Let op lucht tussen beschermhoes en probe voor kwaliteit beelden