



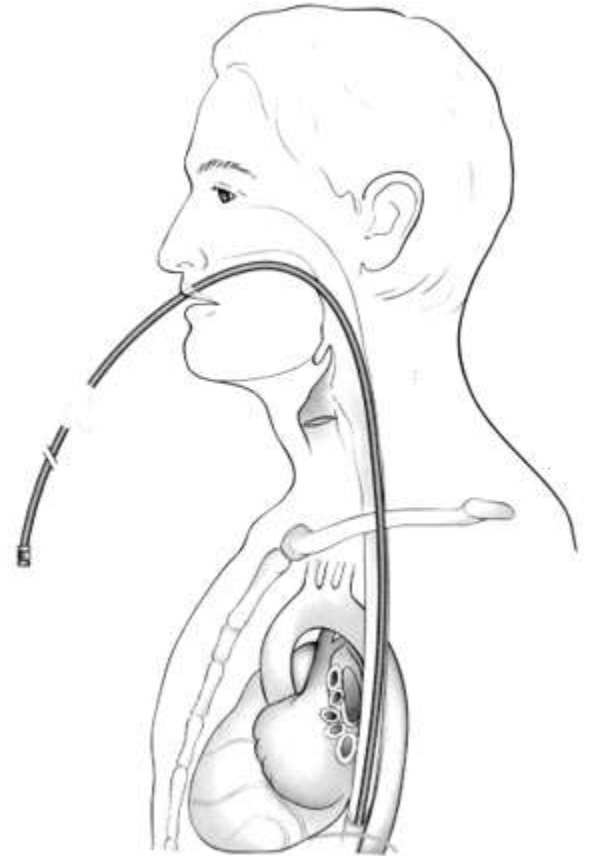
Transoesophagealis echocardiographia

Dr. Asbót Richard
Diagnoscan
Budapest



Történet

- Hanrath 1980
- Monoplan – kb 1990-ig
- Biplan
- Multiplan – standard kb 1995 óta
- Intraoperatív TEE
- 3D - 2007



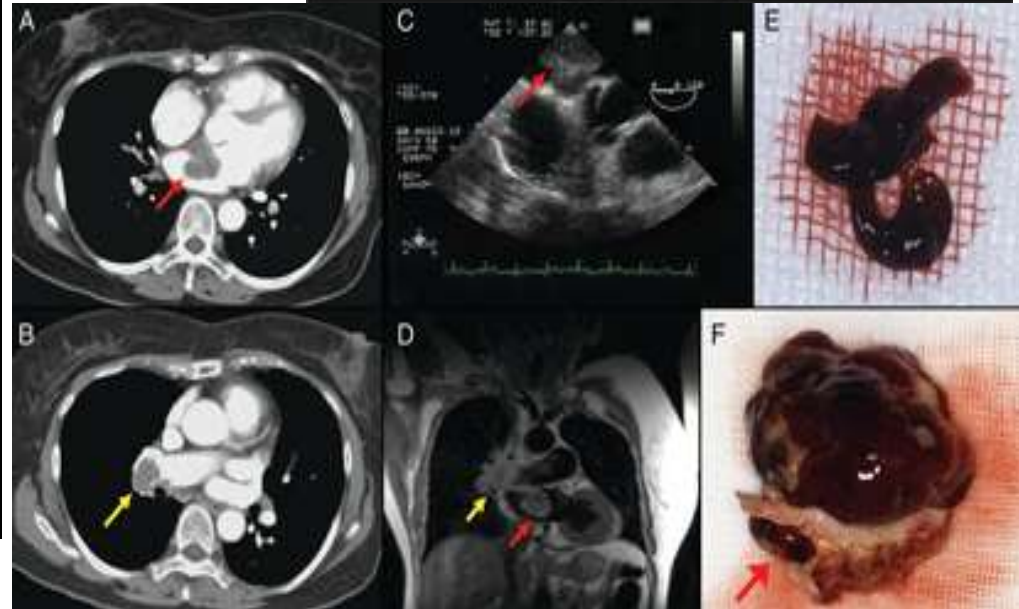
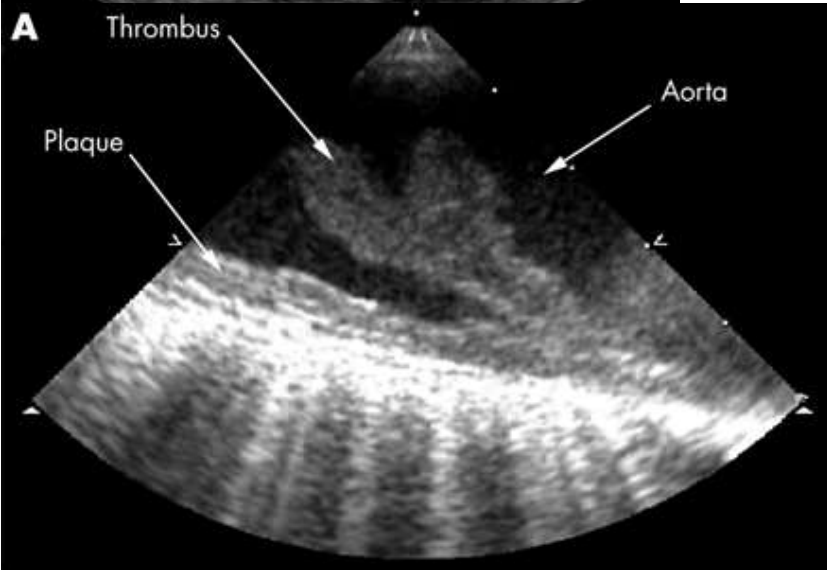
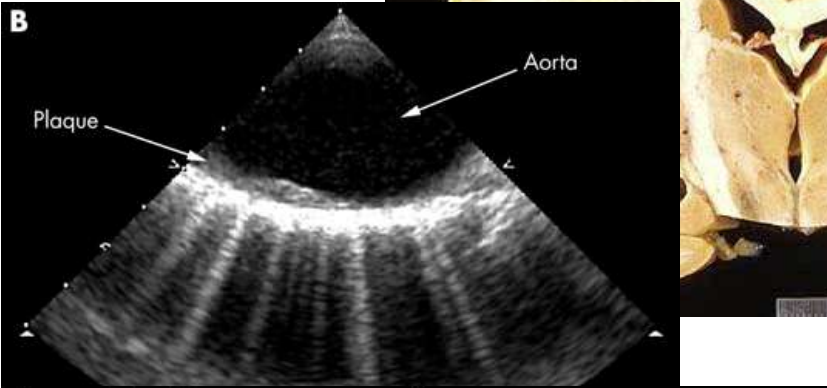
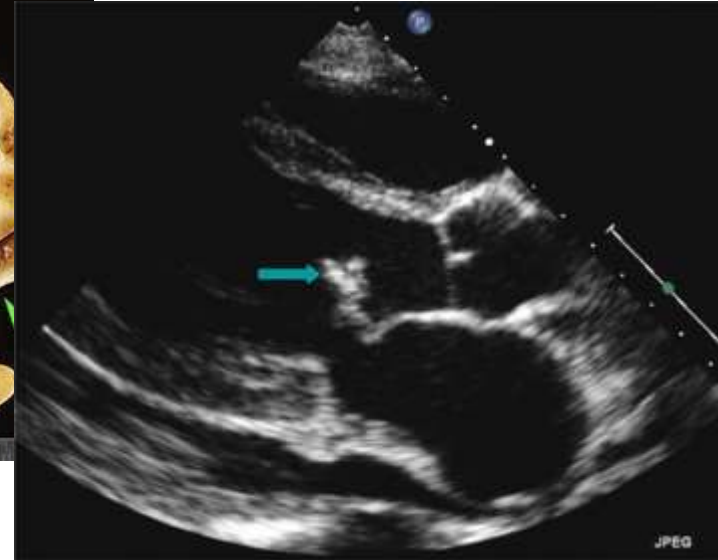
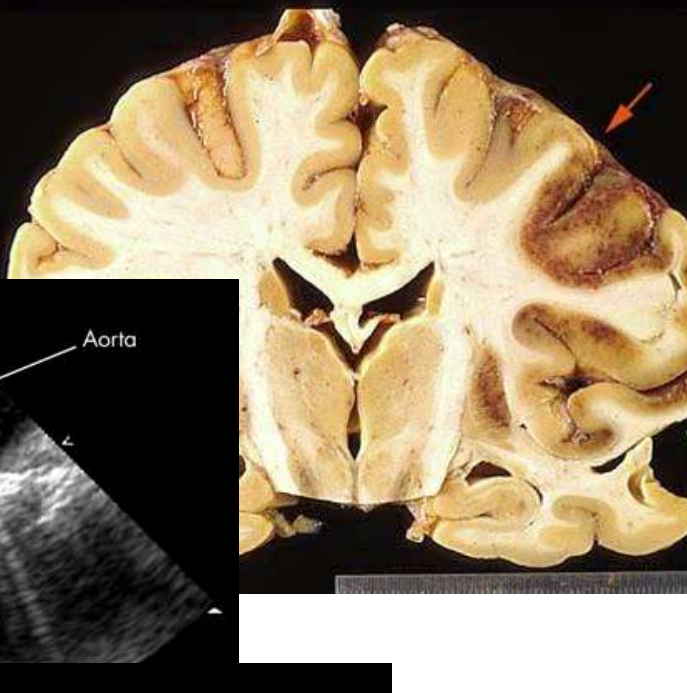
Alkalmazások

- Fejlődési rendellenességek
 - ASD, PFO
- Infektiv endocarditis
- Embóliaforrások
 - bizonyított, (ismétlődő) ischaemiás esemény
- Műbillentyű dysfunctio
- Intraoperativ
- TTE nem informativ
- De NEM: falmozgások, csúcsi thrombus

Embóliaforrás keresése

- Bal kamra csúcs ill. aneurysma
 - transgastrikus és alsó oesophagealis kétüregű
- Aorta és mitrális billentyű
- Aorta
 - ascendens, ív, descendens
- Bal pitvari fülcse
 - PW Doppler, fontos: spontán echokontraszt
- Bal pitvar és interatrialis septum áttekintése
 - fontos: spontán echokontraszt
- Fossa ovalis/foramen ovale/ASD
 - kontraszt+Valsalva

Vegetatio

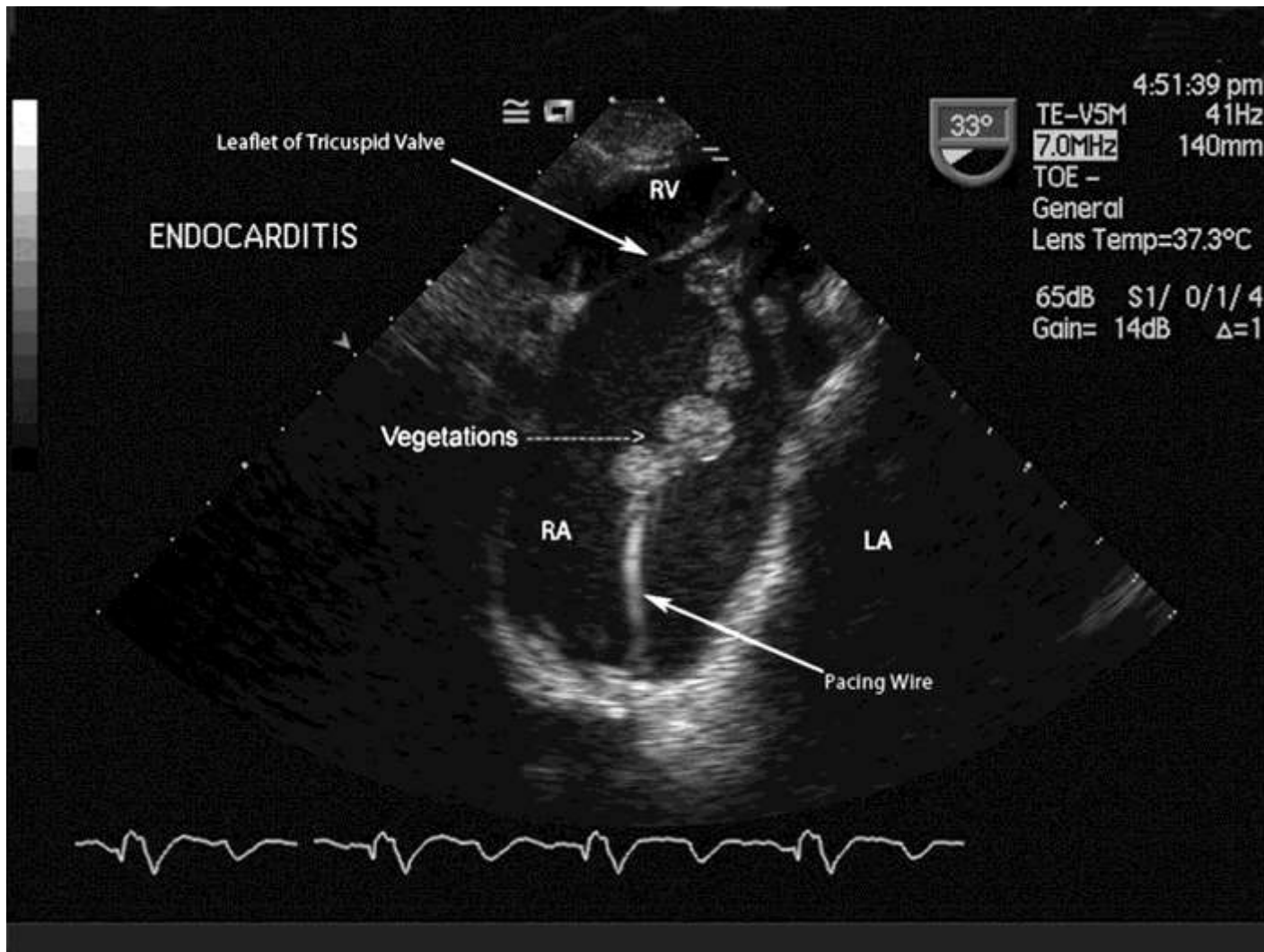


Thrombus

Tumor

Infektiv endocarditis

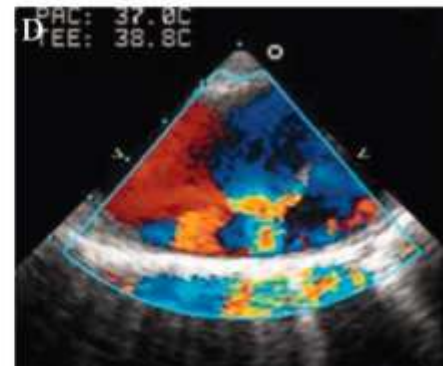
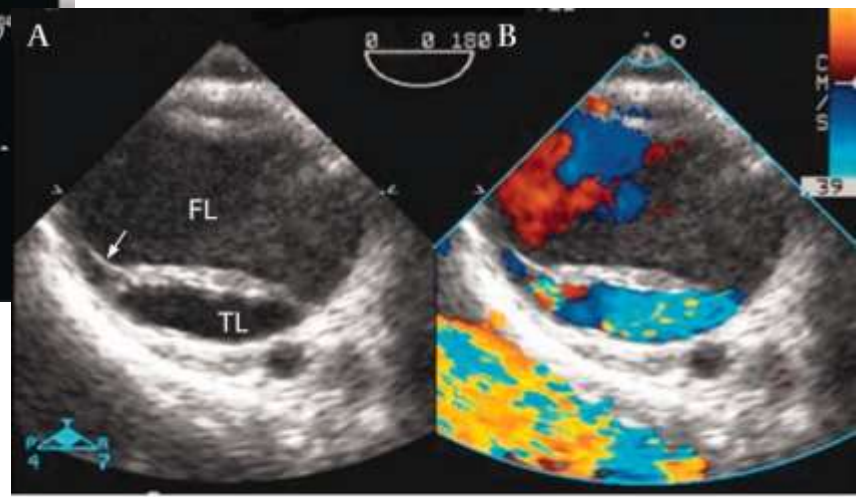
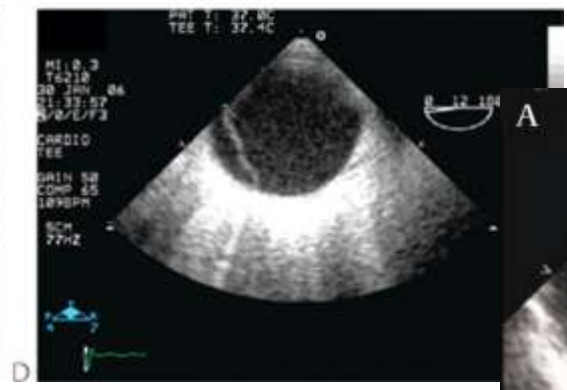
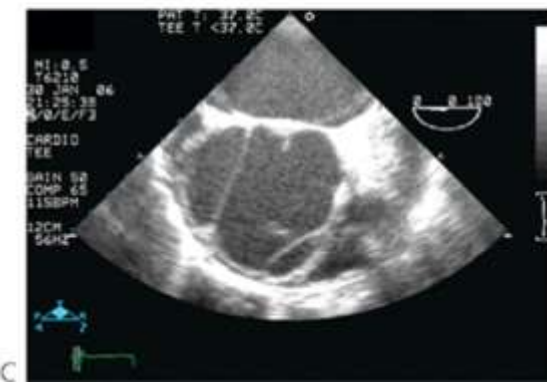
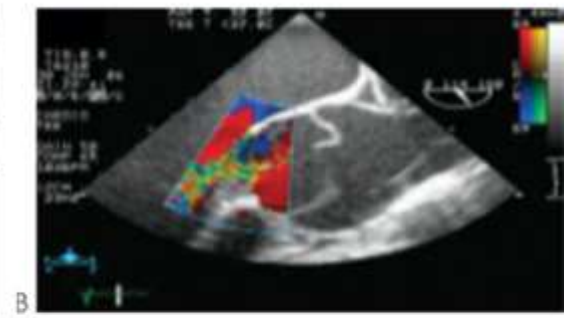
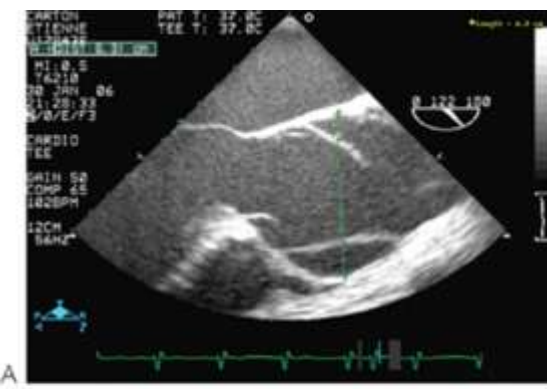
- Mitralis billentyű minden metszete
- Aortabillentyű hossz- és keresztmetszetben; para-aortikus tér: tályog kizárása
 - fontos: aortabillentyű és aortagyök rövid tengelyi nézetben
- Tricuspidális billentyű
 - trangustrikus nézet, alsó oesoph. nézet, jobb kamrai be-ki-áramlás nézete.
- Pacemaker, centralis kanül, aorta graft, Eustach billentyű, pulmonalis billentyű
 - jobb pitvari nézet, magas basalis rövid tengelyű jobbkamrai (be-kiáramlási) nézet



Pacemaker endocarditis

Aorta dissectio, aorta aneurysma

- Aorta ascendens
 - hossz tengelyi, rövidtengelyi nézet, maximális átmérő, FONTOS: flap vagy intramuralis haematoma, para-aortikus folyadék
- Aorta descendens
 - hossz tengelyi, rövidtengelyi nézet, maximális átmérő, FONTOS: flap vagy intramuralis haematoma, para-aortikus folyadék
- Aortaív
 - hossz tengelyi, rövidtengelyi nézet, maximális átmérő, FONTOS: flap vagy intramuralis haematoma, para-aortikus folyadék
- Aortabillentyű
 - regurgitatio, anulus átmérő, vitorlák száma
- A dissectiós membrán viszonya a coronaria szájadékokhoz
- Pericardialis folyadék, pleuralis folyadék
- A dissectio belépési, visszalépési helyei
 - színes Dopplerrel
- Spontán kontraszt ill. thrombusképződés a fals lumenben
 - színes Doppler mutatja a fals lumenben az áramlás meglétét vagy hiányát



Mitrális regurgitatio

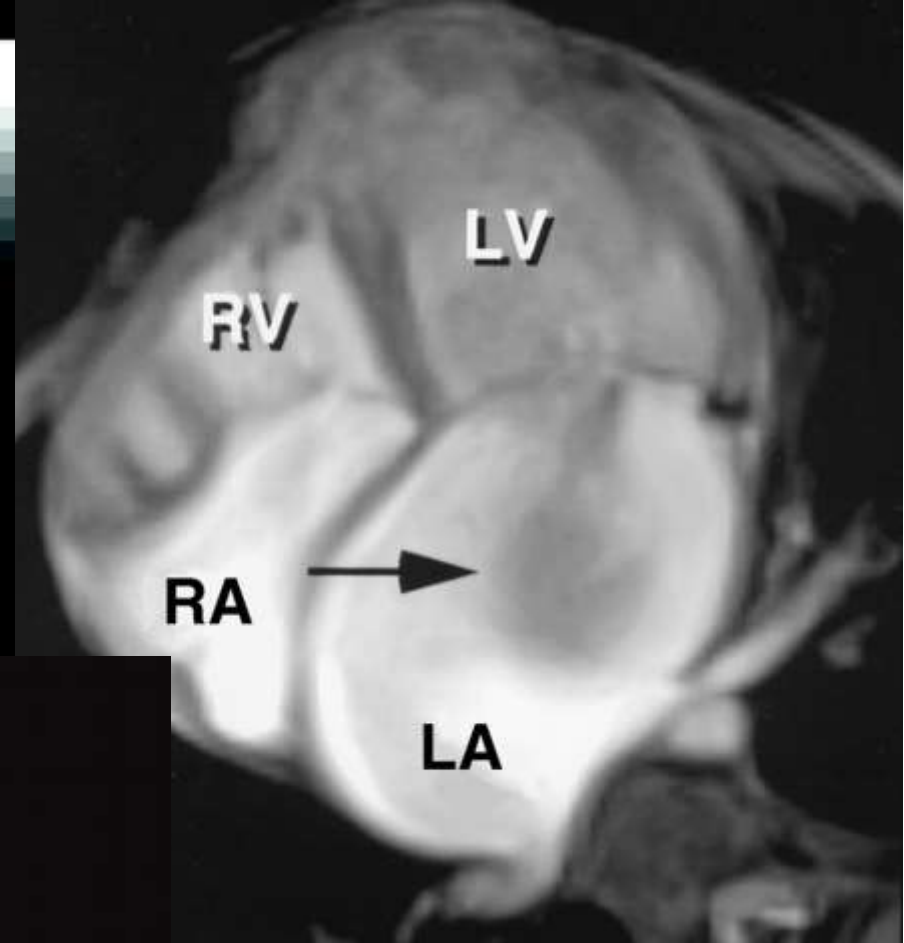
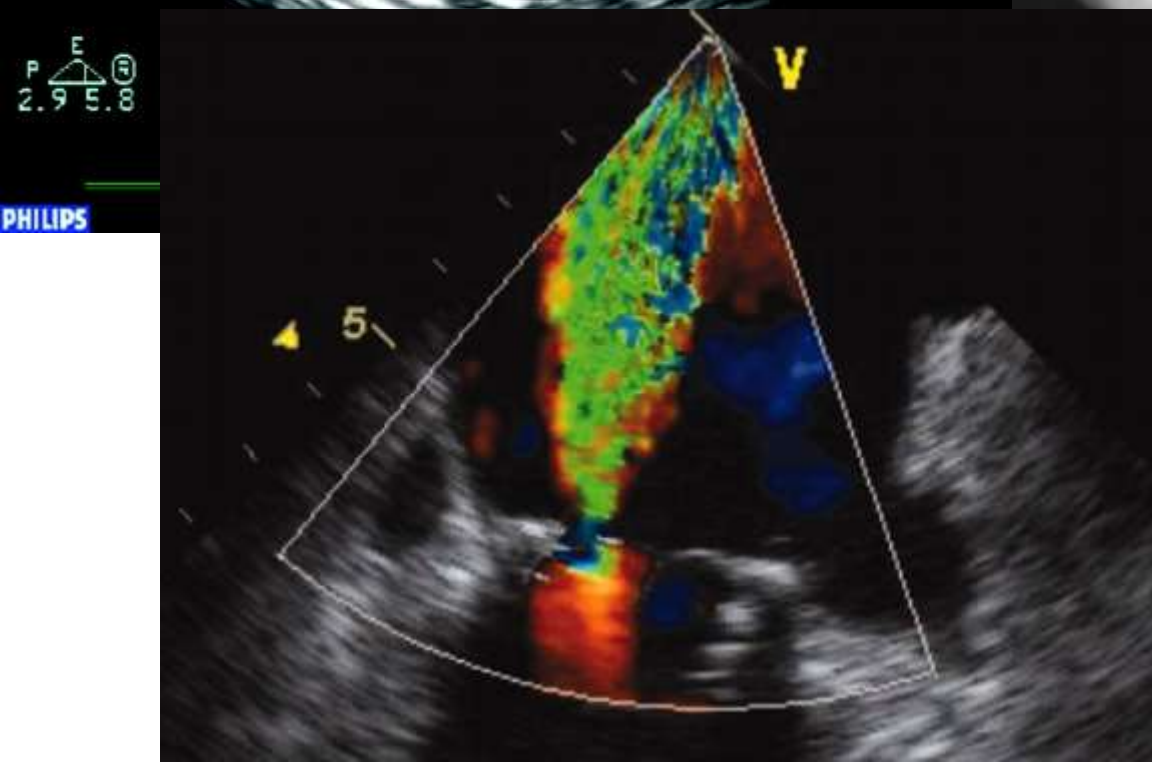
- Mitrális anatómia
 - transgastrikus basalis rövid tengelyi nézet, alsó transoesoph. nézetek. **FONTOS:** a regurgitatio helyének, eredetének tisztázása (a prolapsus/flail helye, viszonya a vitorlák boltozataihoz, a papilláris izmokhoz; chordák integritása; vegetatio; paraprosth. leak
- A bal pitvar színes Doppler térképezése
 - jet szélesség, proximalis convergencia-zóna
- Pulmonalis vena PW Doppler
 - Bal felső, excentrikus jet esetén a jobb felső is
- **FONTOS: vérnyomás feljegyzése!**
 - systolés vagy középnyomás

T. FAZ: 37.0C
T. TEE <37.0C

4:52:14.27
GLAD 50
CCMP 70
14CM
25HZ

P E
2.9 5.8

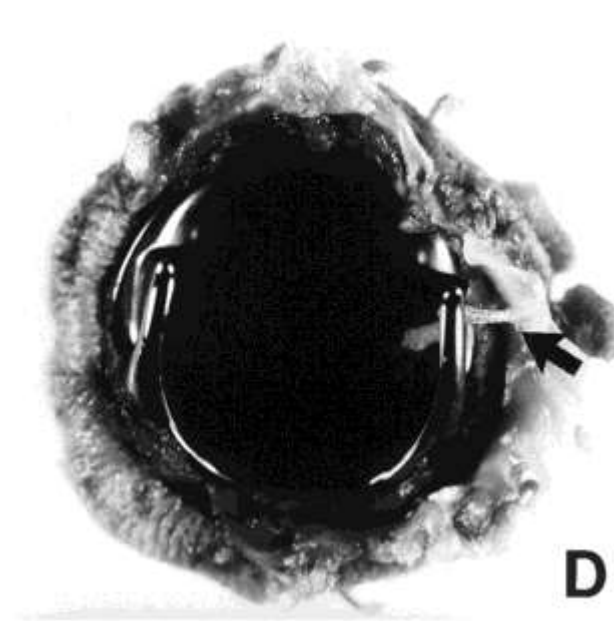
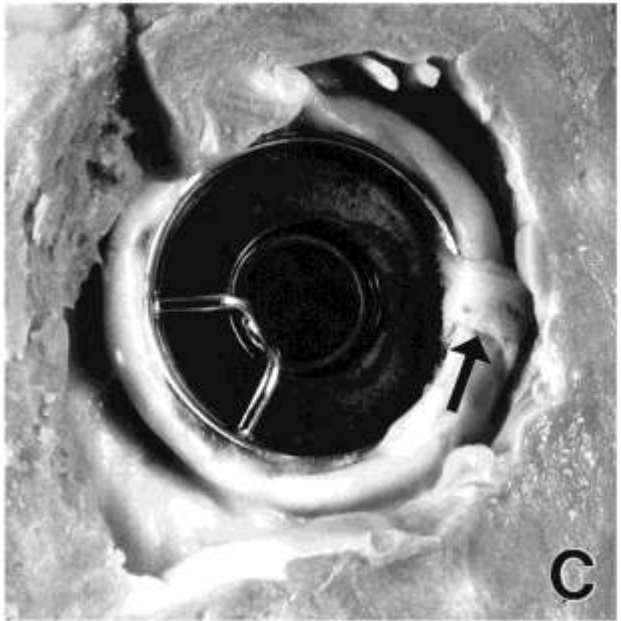
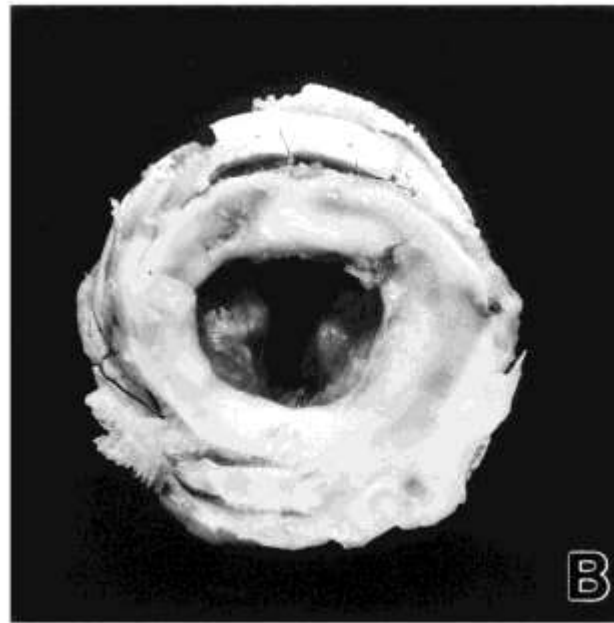
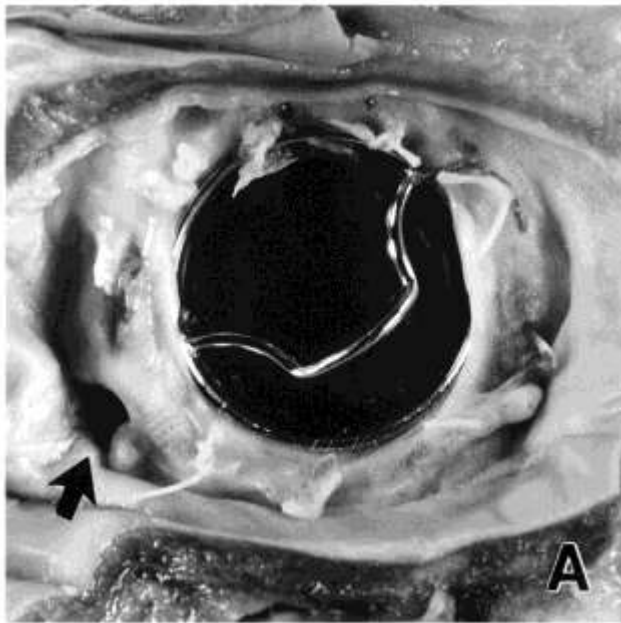
PHILIPS



Műbillentyű vizsgálata

- Obstructio morfológiai és/vagy Doppler jelei
 - a tasakok/vitorlák/lemezek csökkent nyílása/mobilitása és emelkedett CW Doppler sebességek
- Regurgitatio morfológiai és/vagy Doppler jelei
 - a regurgitatio eredetének specifikus helyekhez köthető feltérképezése (transprosthetikus, paraprosthetikus)
 - dehiscentia kimutatása
- A műbillentyű morfológiai eltéréseinek kimutatása
 - meszesedés, bioprotézis perforációja, occluder eltűnése
- Egyéb paraprostethikus struktúrák kimutatása
 - vegetatio/thrombus/pannus, varróanyag, kötegek, tályogok, pseudoaneurysma, fistula

Műbillentyű patológia



- A – PV leak
- B – pannus
- C – mitral app
- D – suture end



Műbillentyű thrombus, lysis

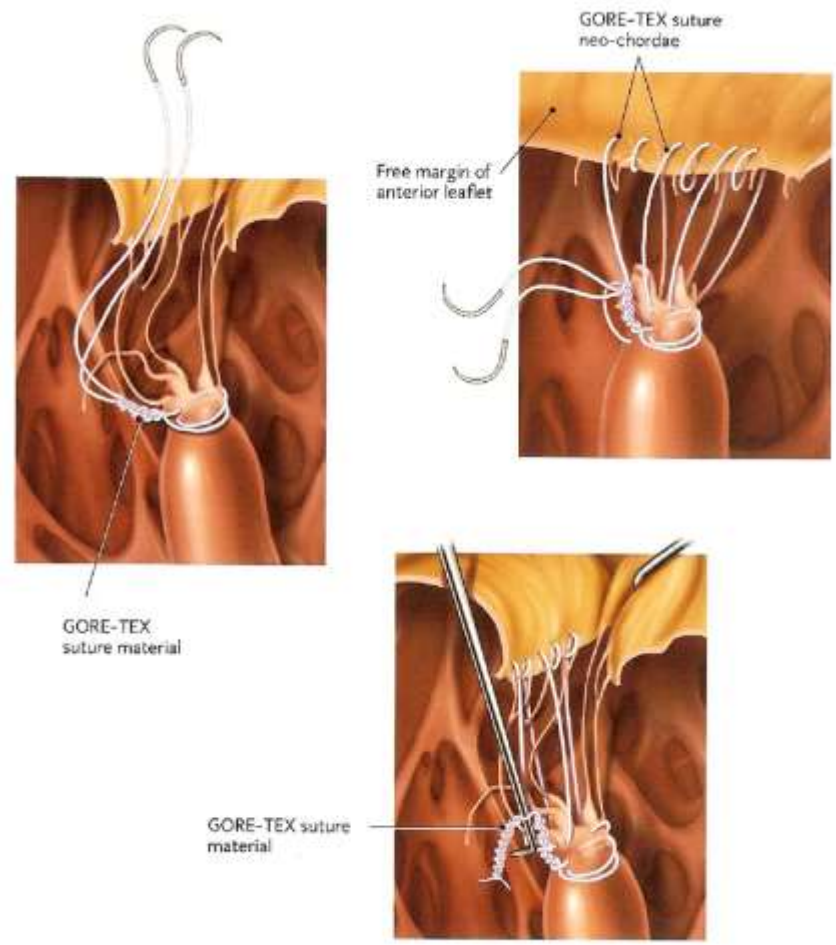
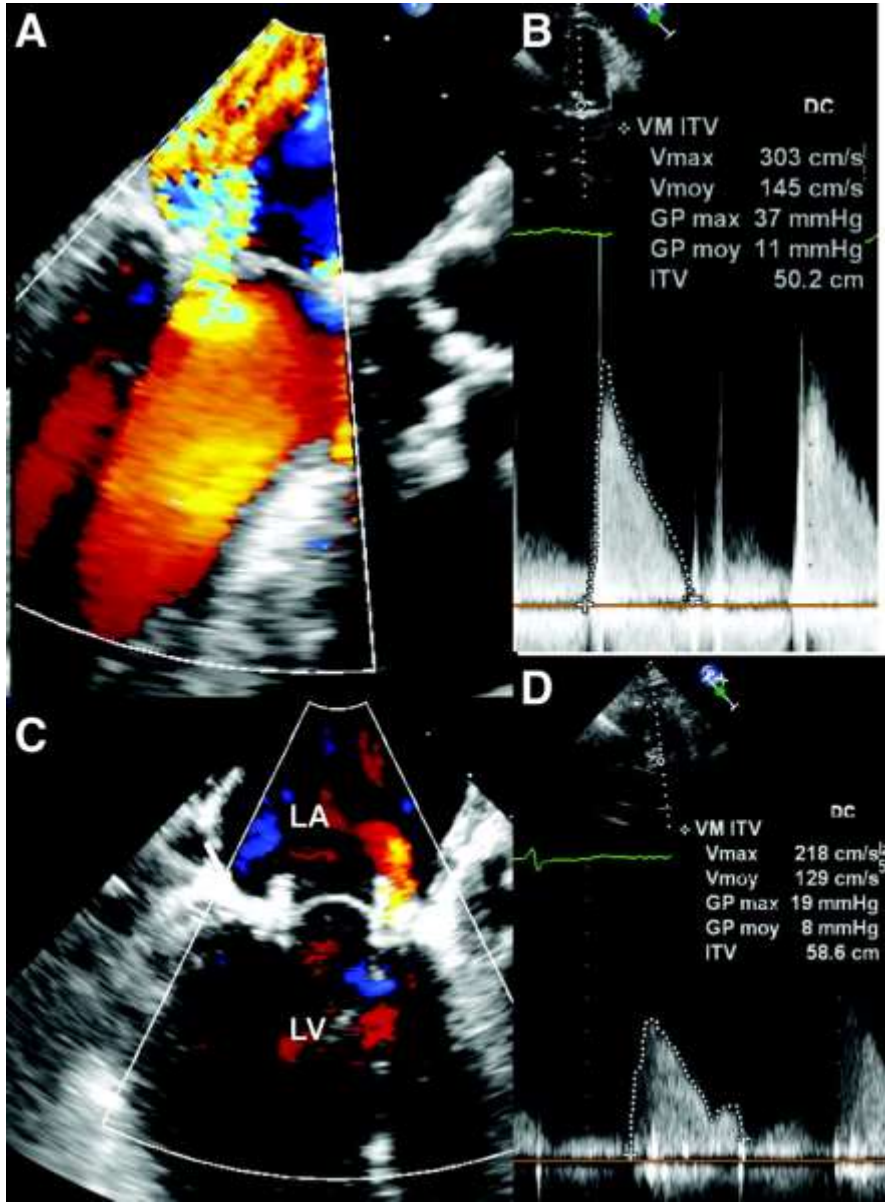


Seiler C, Heart 2004;90:818-824

Intraoperatív TE

- Sebészi billentyűhelyreállítás (mitrális vagy aorta)
 - a siker megítélése a mellkas zárása előtt
- Bypassműtét alatt és után
 - a bal és jobb kamrai globális és regionális functio valamint a billentyűműködések megítélése; intracardialis levegő és a vent monitorozása
- A haemodynamika (nem csak szív-)műtét alatti hirtelen romlása esetén
 - a bal és jobb kamrai globális és regionális functio valamint a billentyűműködések és az aorta integritásának megítélése
- Aorta pathologia megítélése

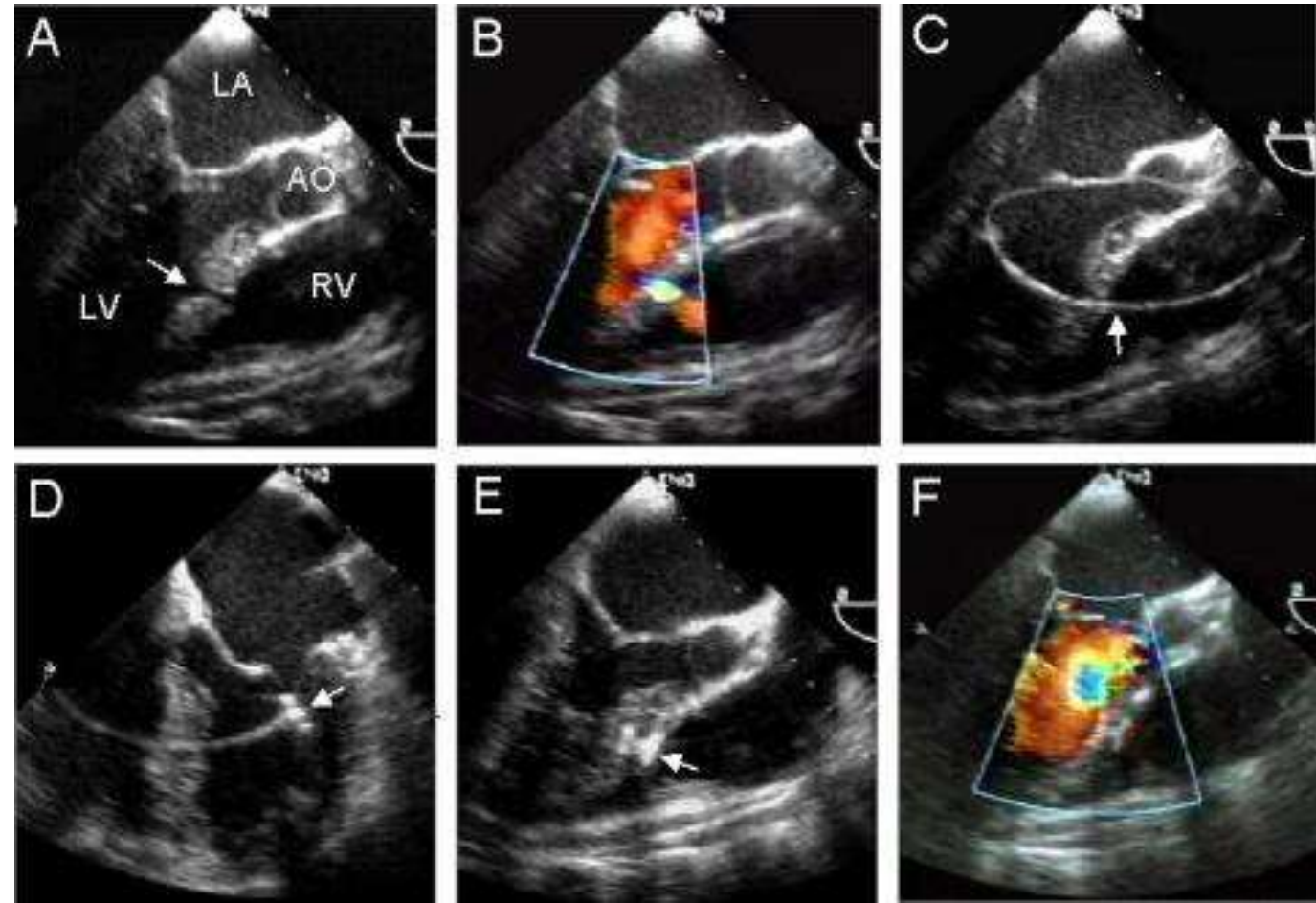
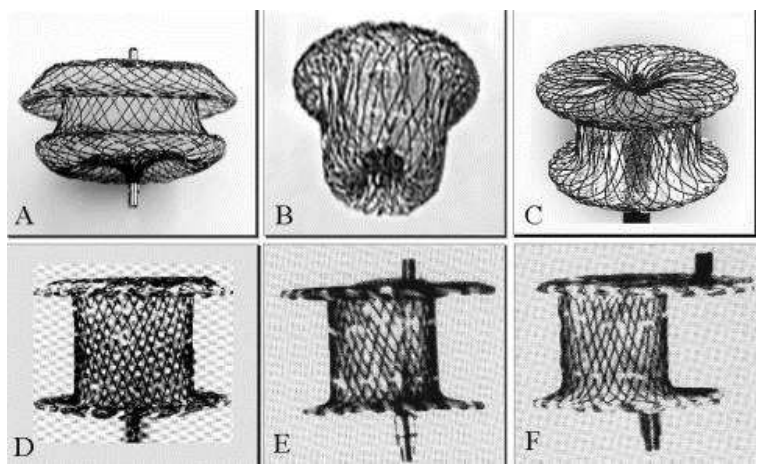
Neochordae

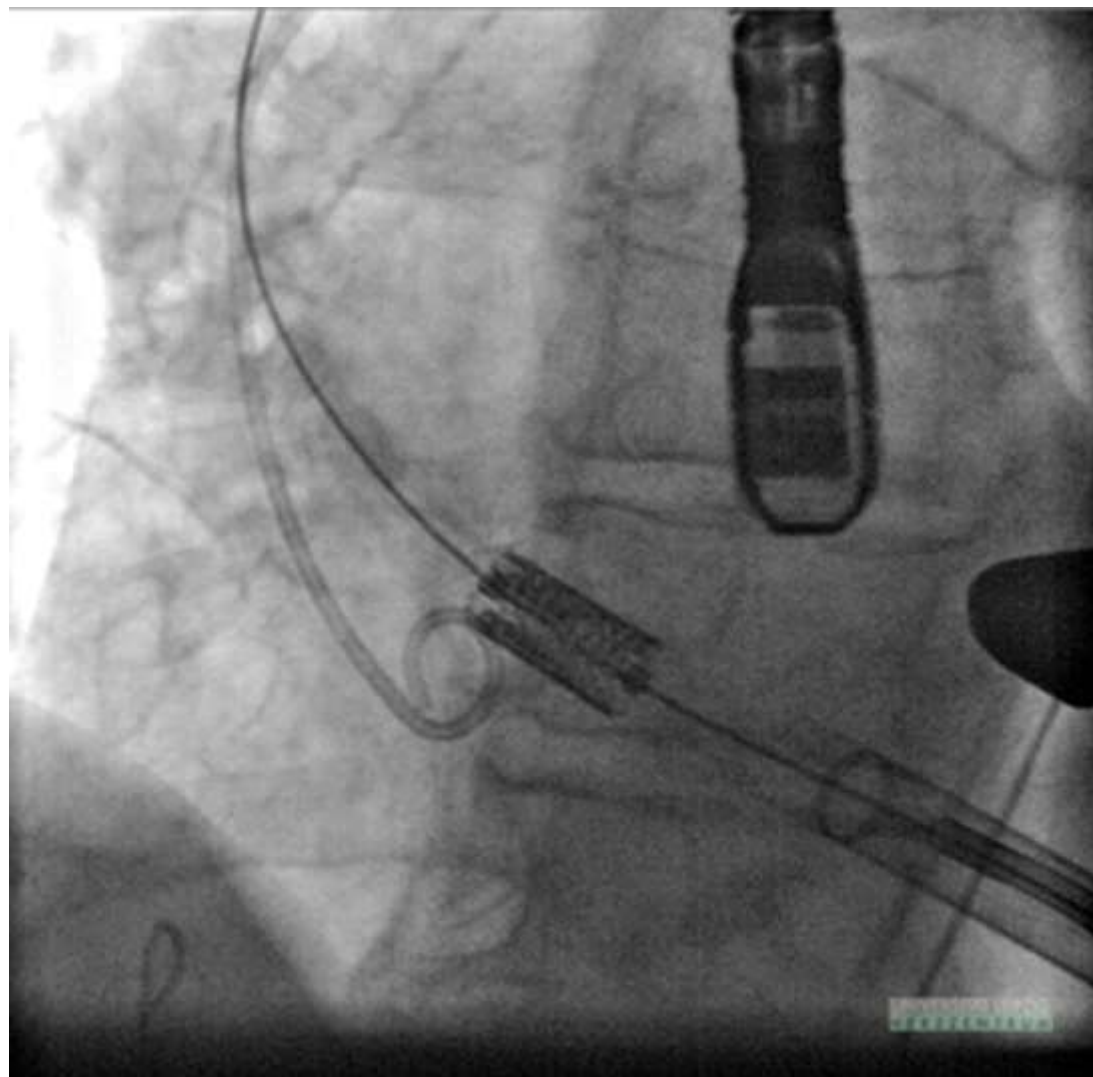
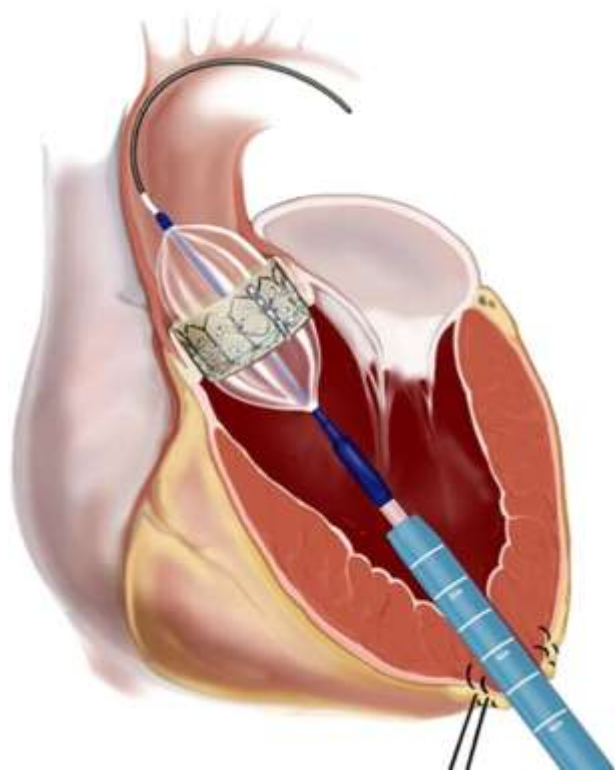


Mitral repair

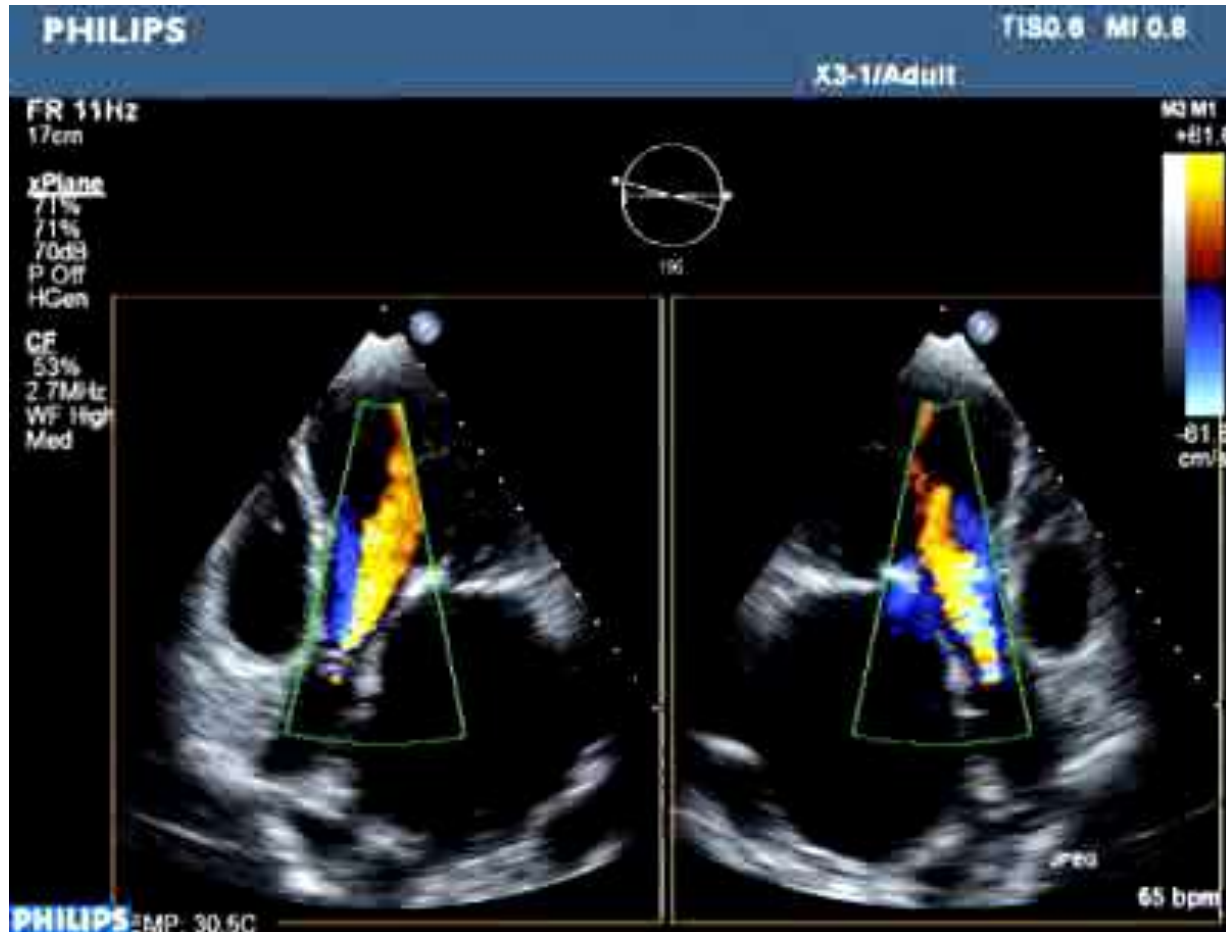
TE cardialis interventióknál

- Mitrális valvuloplasztika
 - bal pitvari thrombus keresése, a transseptalis punctio vezérlése, a valvuloplasztika eredménye és a valvuloplasztika utáni regurgitáció megítélése
- Eszközös zárások
 - ASD, PFO, paraproteetikus leak, bal fülcse zárás
- Percutan vagy transapicalis aortabillentyű beültetés
 - a bal kamrai kiáramlás átmérőjének mérése a beavatkozás előtt
- Percutan mitrális repair





Live 3-D TEE



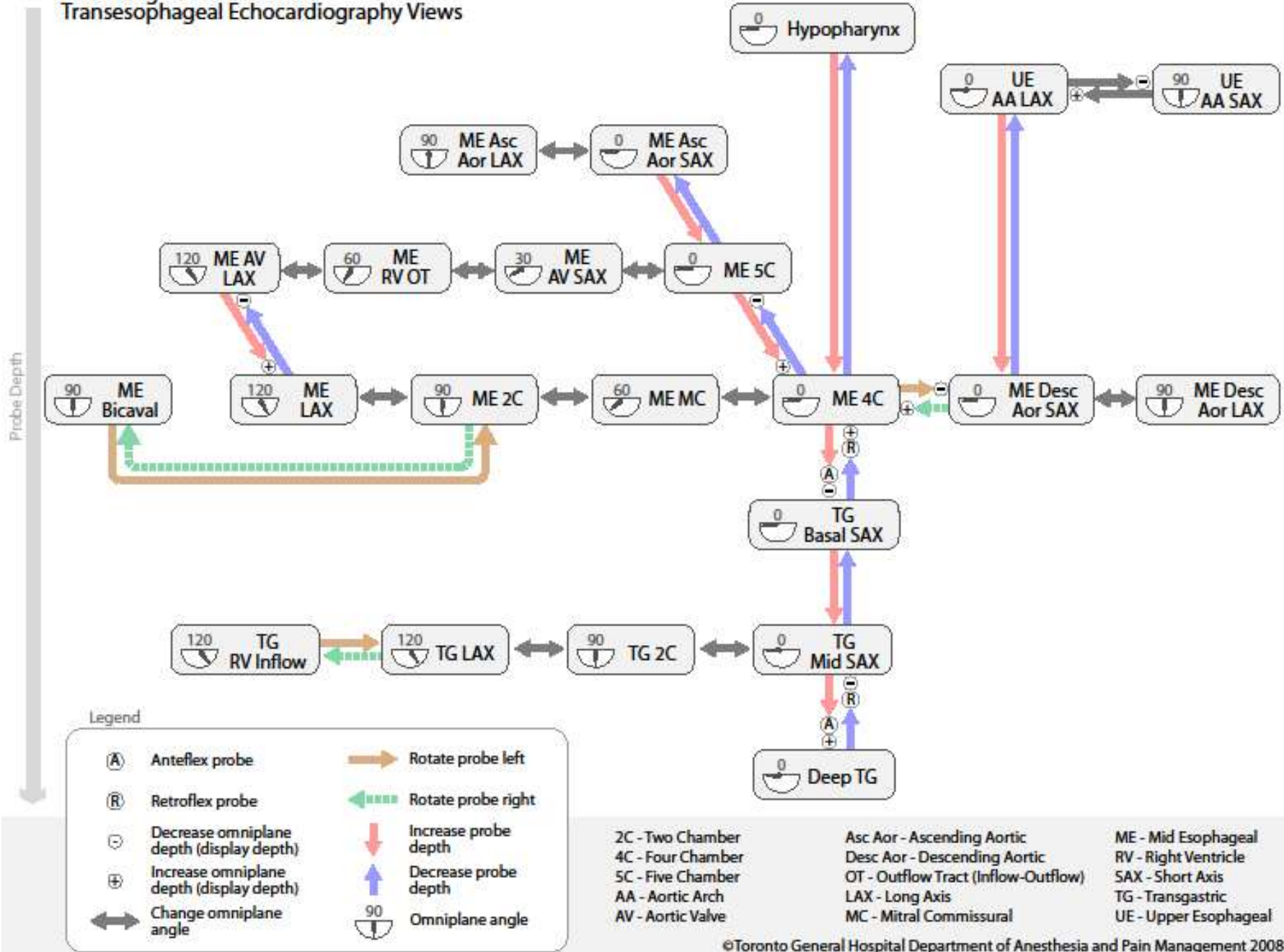
TEE – orvos-beteg interakció

- Gyógyszeres és pszichés előkészítés
 - Már a váróhelyiségben kezdve
- Alapos érzéstelenítés
- Ne nyeljen!
- Vezető kéz a szájban?
 - Eszközkímélet
- Figyelemmegosztás
 - Orvos: cső, gép, dokumentálás
 - Asszisztens: beteg

TEE – síkok, mérések

- Folyamatos video v. DVD (indítás ...!!)
- Minden sík fontos
- Mérés (távolság, area, sebesség)
 - Mindíg fotóval!
- Vége: ha komplett
 - diagnosztikus és demonstrábilis
 - Megvan a válasz a szükséges döntéshez (ha nincs eldöntendő kérdés: fölösleges a vizsgálat)

Obtaining the 20 Standard Transesophageal Echocardiography Views





GUIDELINES FROM THE WORKING GROUP

Recommendations for Performing Transoesophageal Echocardiography

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J. R. T. C. Roelandt⁴ for the Subgroup on Transoesophageal Echocardiography
and Valvular Heart Disease, on behalf of the Working Group on
Echocardiography of the European Society of Cardiology**

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Recommendations for transoesophageal echocardiography: update 2010

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1) Search for a potential cardiovascular source of embolism

Left ventricular apex or aneurysm (transgastric and low-transoesophageal two-chamber views)

Aortic and mitral valve (look for vegetations, degenerative changes, or tumours, e.g. fibroelastoma)

Ascending and descending aorta, aortic arch

Left atrial appendage (including pulsed wave Doppler); note spontaneous contrast

Left atrial body including atrial septum; note spontaneous contrast

Fossa ovalis/foramen ovale/atrial septal defect/atrial septal aneurysm; contrast + Valsalva

2) Infective endocarditis

Mitral valve in multiple cross-sections

Aortic valve in long- and short-axis views; para-aortic tissue (in particular short-axis views of aortic valve and aortic root) to rule out abscess

Tricuspid valve in transgastric views, low oesophageal view, and right ventricular inflow-outflow view

Pacemaker, central intravenous lines, aortic grafts, Eustachian valve, pulmonic valve in high-basal short-axis view of the right heart (inflow-outflow view of the right ventricle)

3) Aortic dissection, aortic aneurysm

Ascending aorta in long- and short-axis views; note maximal diameter, flap, intramural haematoma, para-aortic fluid

Descending aorta in long- and short-axis views; note maximal diameter, flap, intramural haematoma, para-aortic fluid

Aortic arch; note maximal diameter, flap, intramural haematoma, para-aortic fluid

Aortic valve (regurgitation—note mechanism, annular and aortic diameters, number of cusps)

Relation of dissection membrane to coronary ostia

Pericardial effusion, pleural effusion

Entry/re-entry sites of dissection (use colour Doppler)

Spontaneous contrast or thrombus formation in false lumen (use colour Doppler to characterize flow/absence of flow in false lumen)

TEE indications: essential views and structures in specific clinical situations

4) Mitral regurgitation (note systolic or mean blood pressure)

Mitral anatomy (transgastric basal short-axis view, multiple lower transoesophageal views). Emphasis on detection of mechanism and origin of regurgitation (detection and mapping of prolapse/flail to leaflets and scallops, papillary muscle and chordal integrity, vegetations, paraprosthetic leaks)

Colour Doppler mapping of regurgitant jet with emphasis on jet width and proximal convergence zone

Left upper pulmonary, and, if eccentric jet present, also right upper pulmonary venous pulsed Doppler

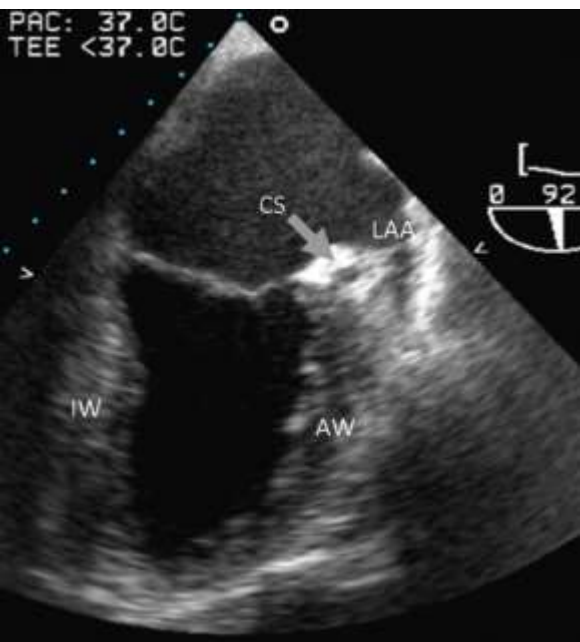
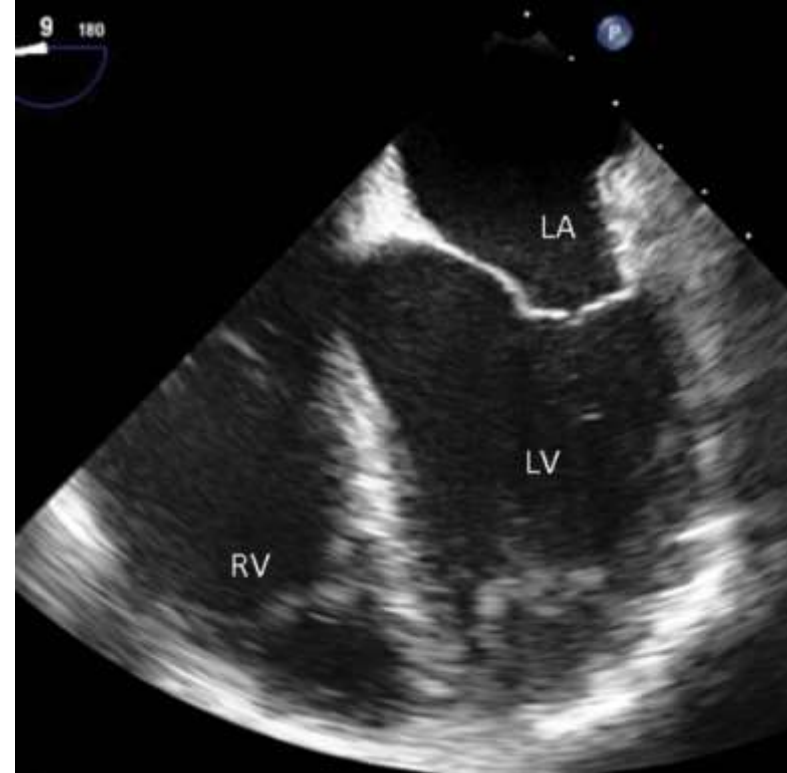
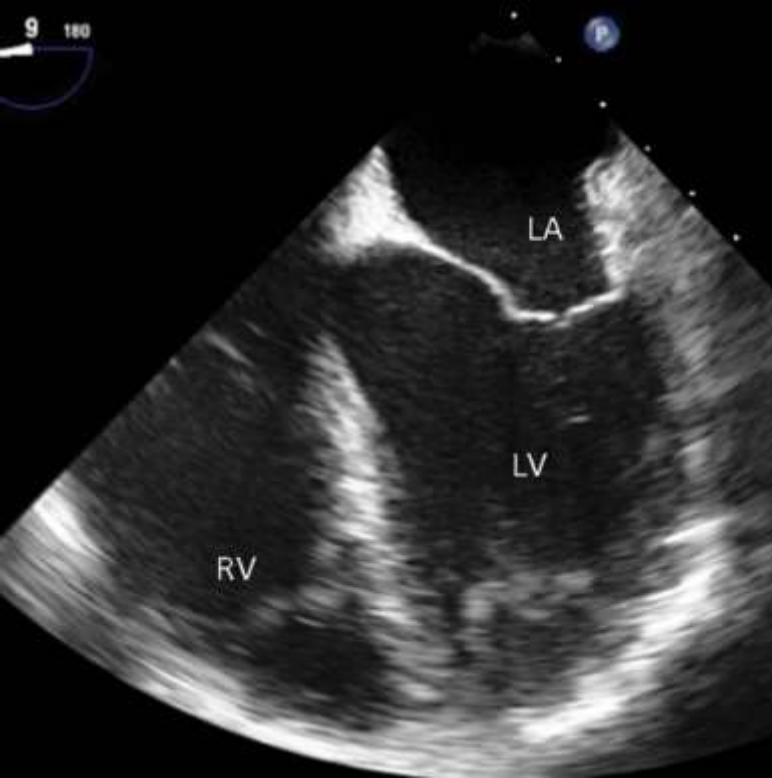
5) Prosthetic valve evaluation

Morphologic and/or Doppler evidence of obstruction (reduced opening/mobility of cusps/disks/leaflets and elevated velocities by CW Doppler)

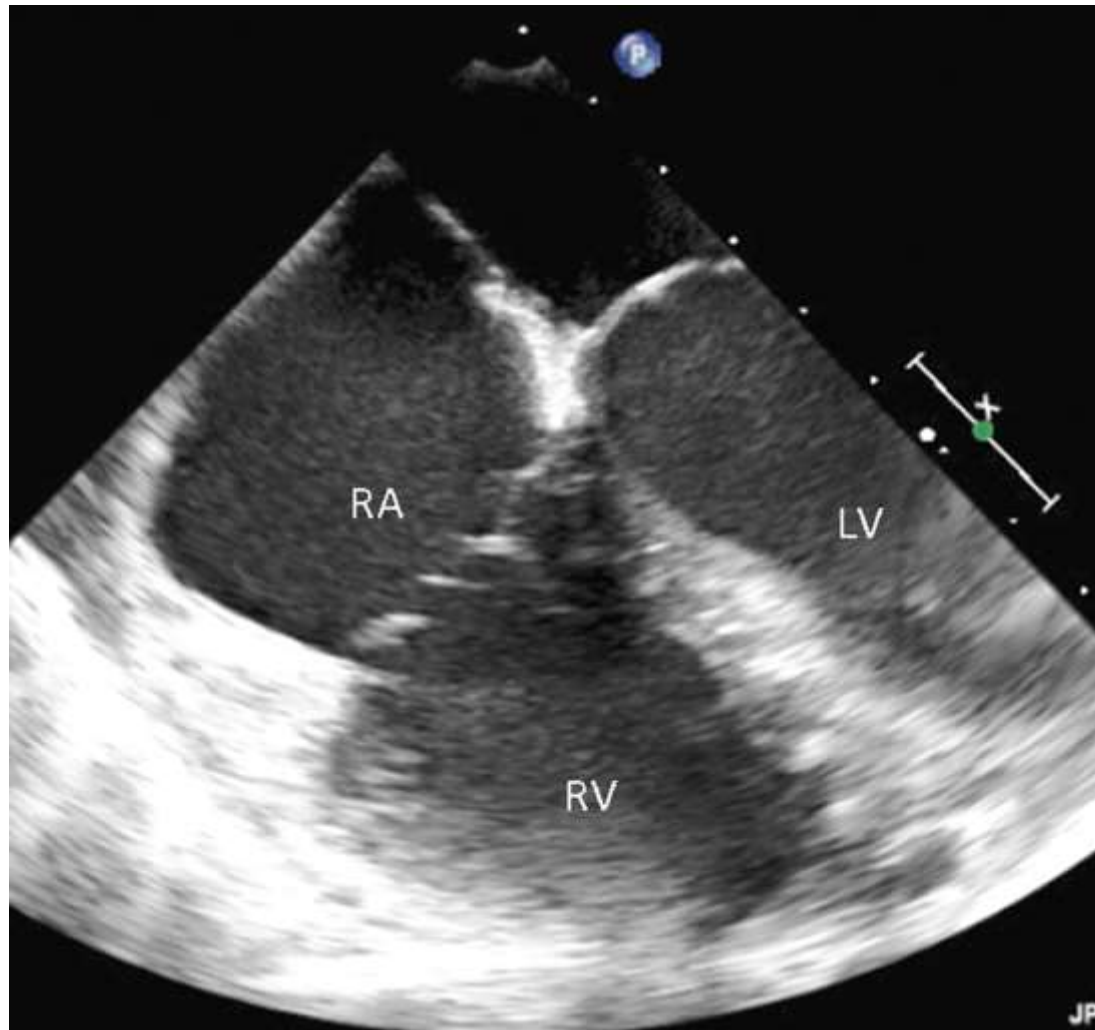
Morphologic and Doppler evidence of regurgitation, with mapping of the origin of regurgitation to specific sites (transprosthetic, paraprosthetic); presence of dehiscence/rocking of prosthesis

Presence of morphologic changes in the prosthetic structure: calcification, immobilization, rupture, or perforation of bioprosthesis leaflets; absence of occluder in mechanical prostheses

Presence of additional paraprosthetic structures (vegetation/thrombus/pannus, suture material, strand, abscess, pseudoaneurysm, fistula)

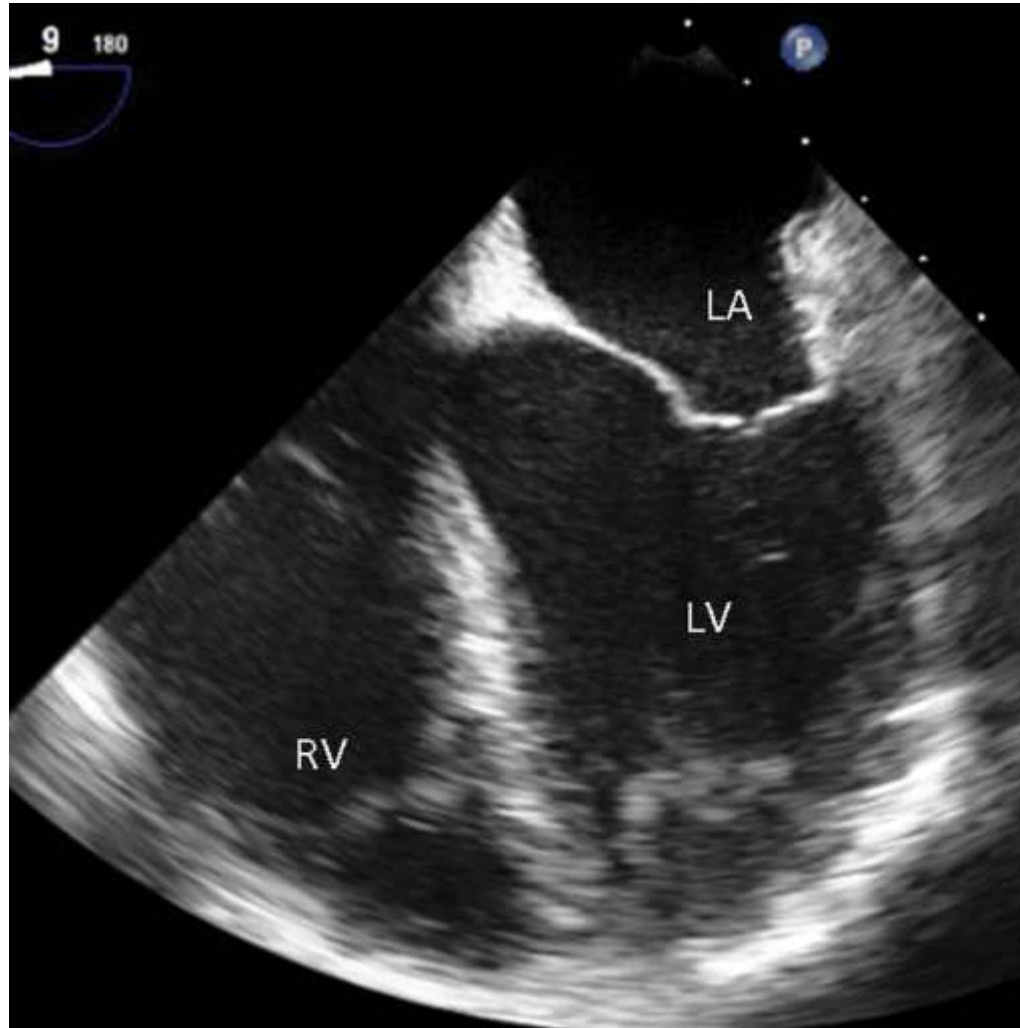


Low transoesophageal view of right ventricle (RV), right atrium (RA), and tricuspid valve.



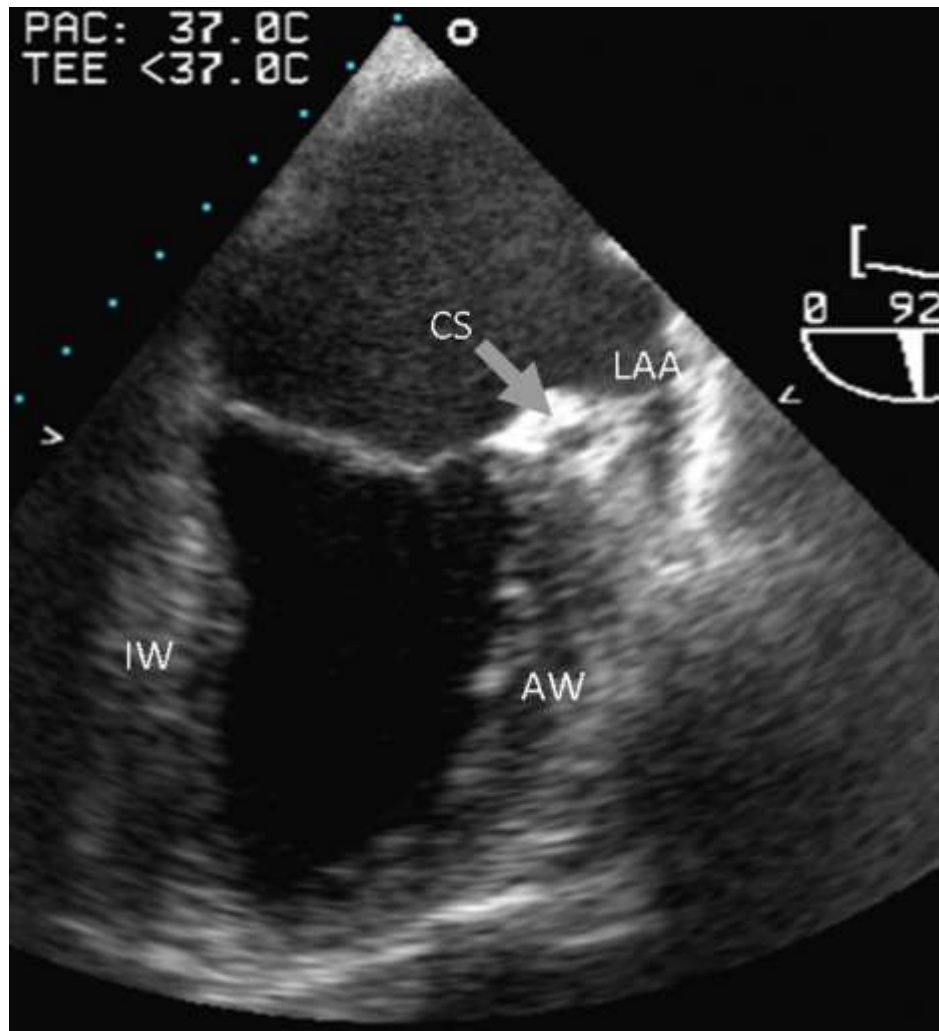
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Transoesophageal four-chamber view.



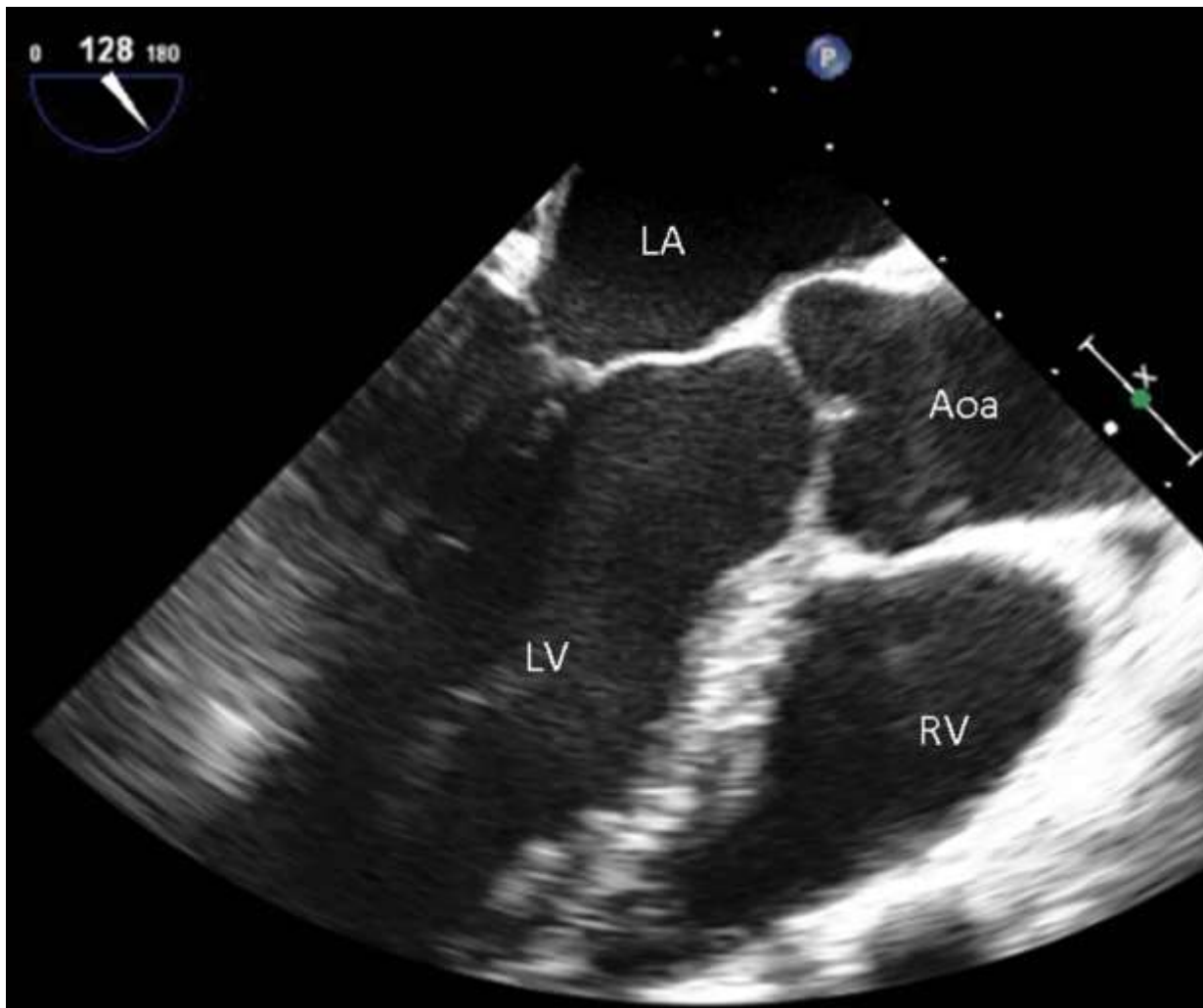
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Transoesophageal two-chamber view.



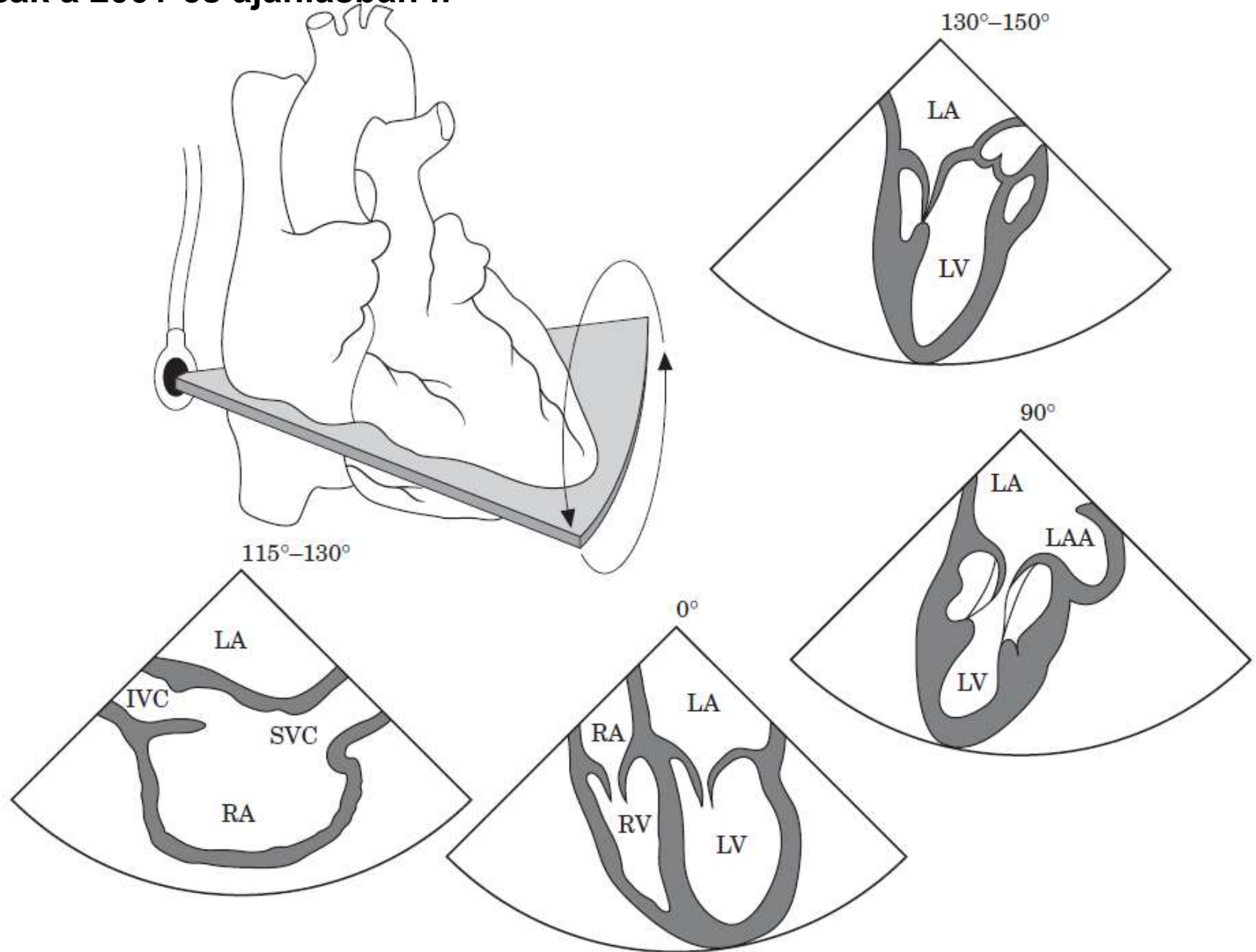
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Transoesophageal long-axis view of the left ventricle.



Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Csak a 2001-es ajánlásban !!



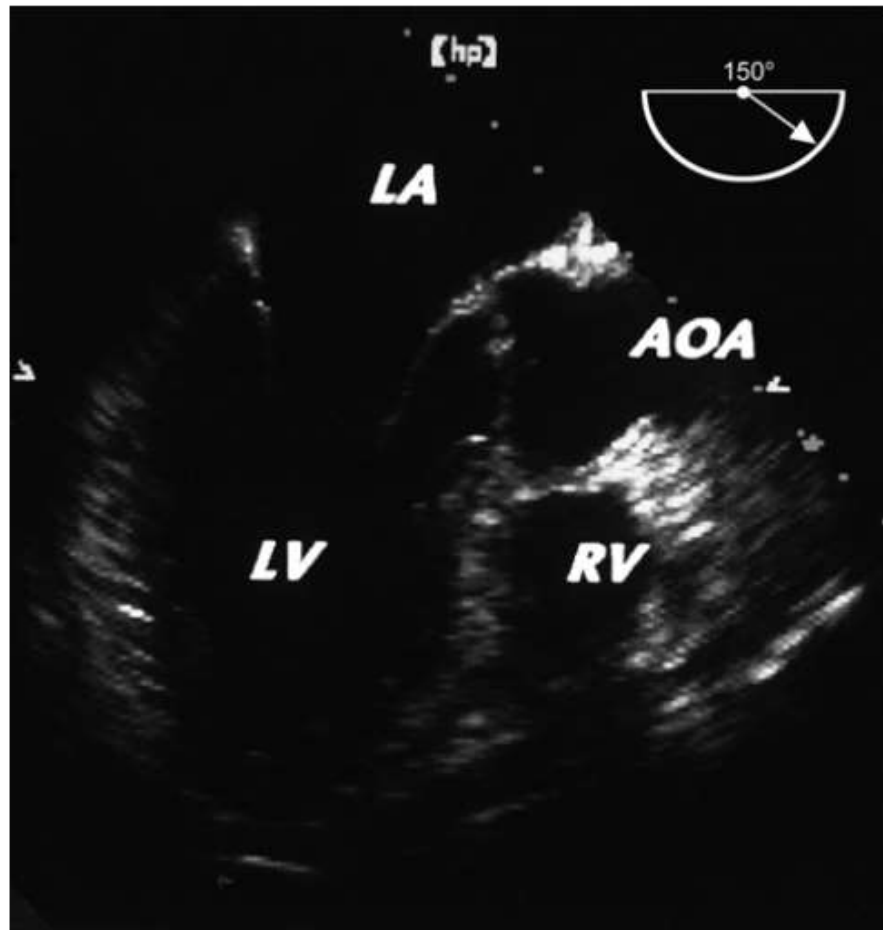


Figure 8. Transoesophageal long-axis view of the left ventricle.

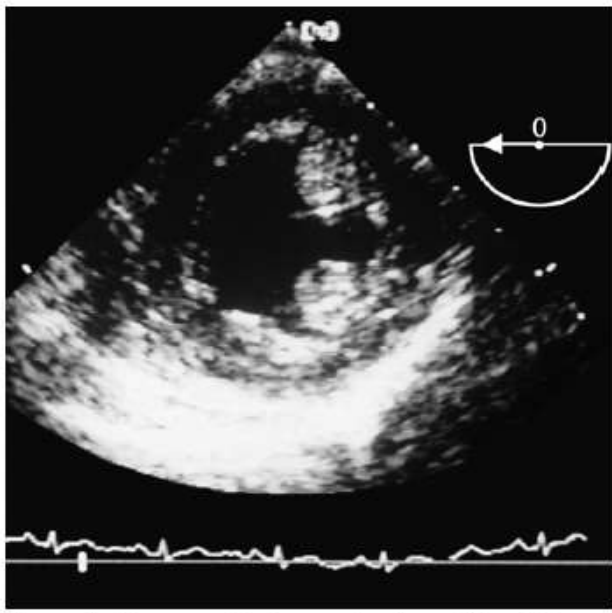


Figure 1. Transgastric short-axis view of the left ventricle at the midpapillary level.

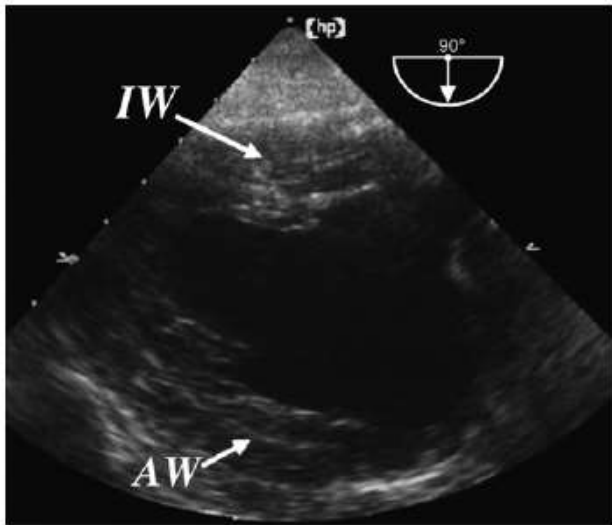


Figure 2. Transgastric two-chamber view. The apex is to the left, and the mitral valve to the right in the image.

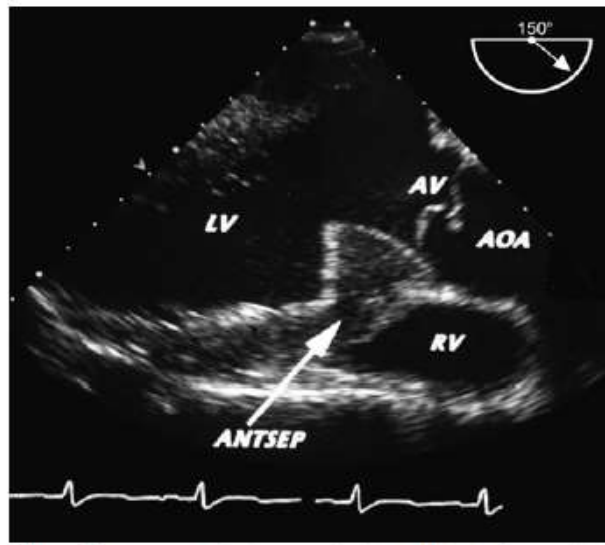


Figure 3. Transgastric long-axis view of the left ventricle.

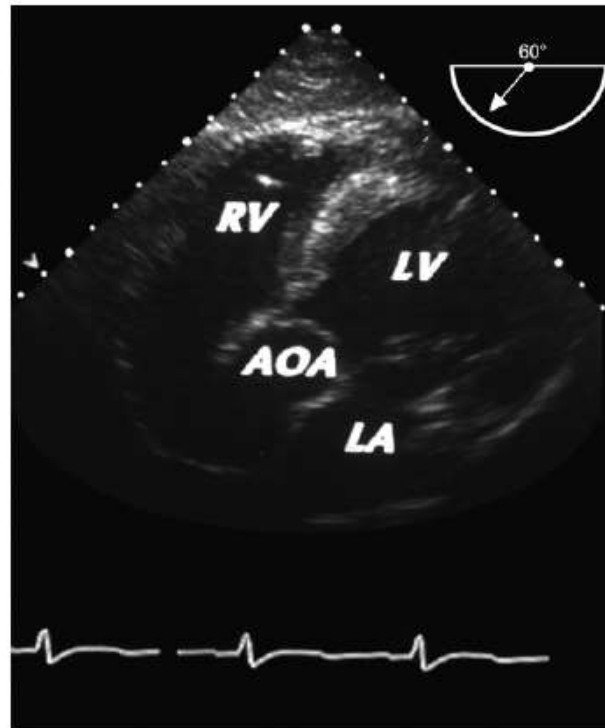
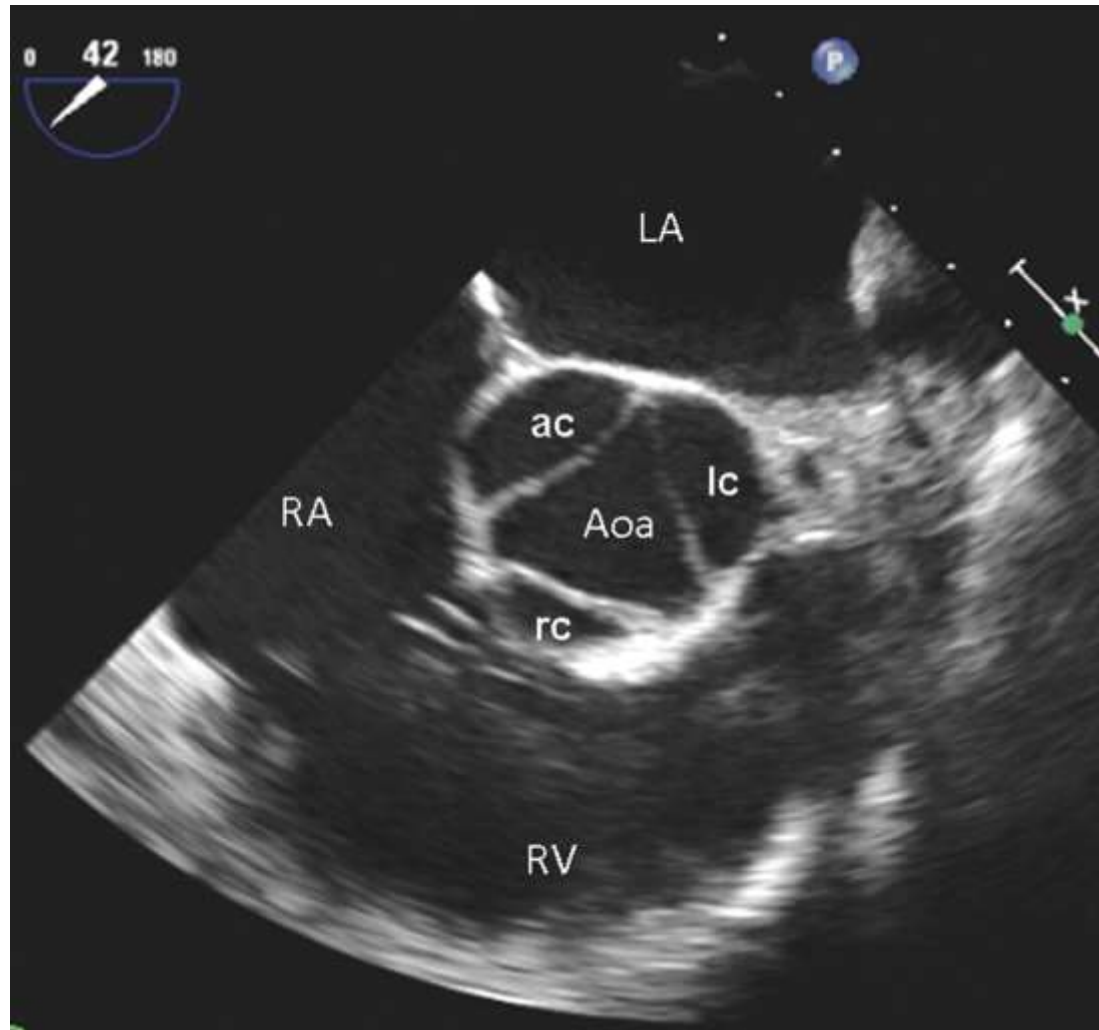


Figure 4. Deep transgastric long-axis view of the left ventricle.

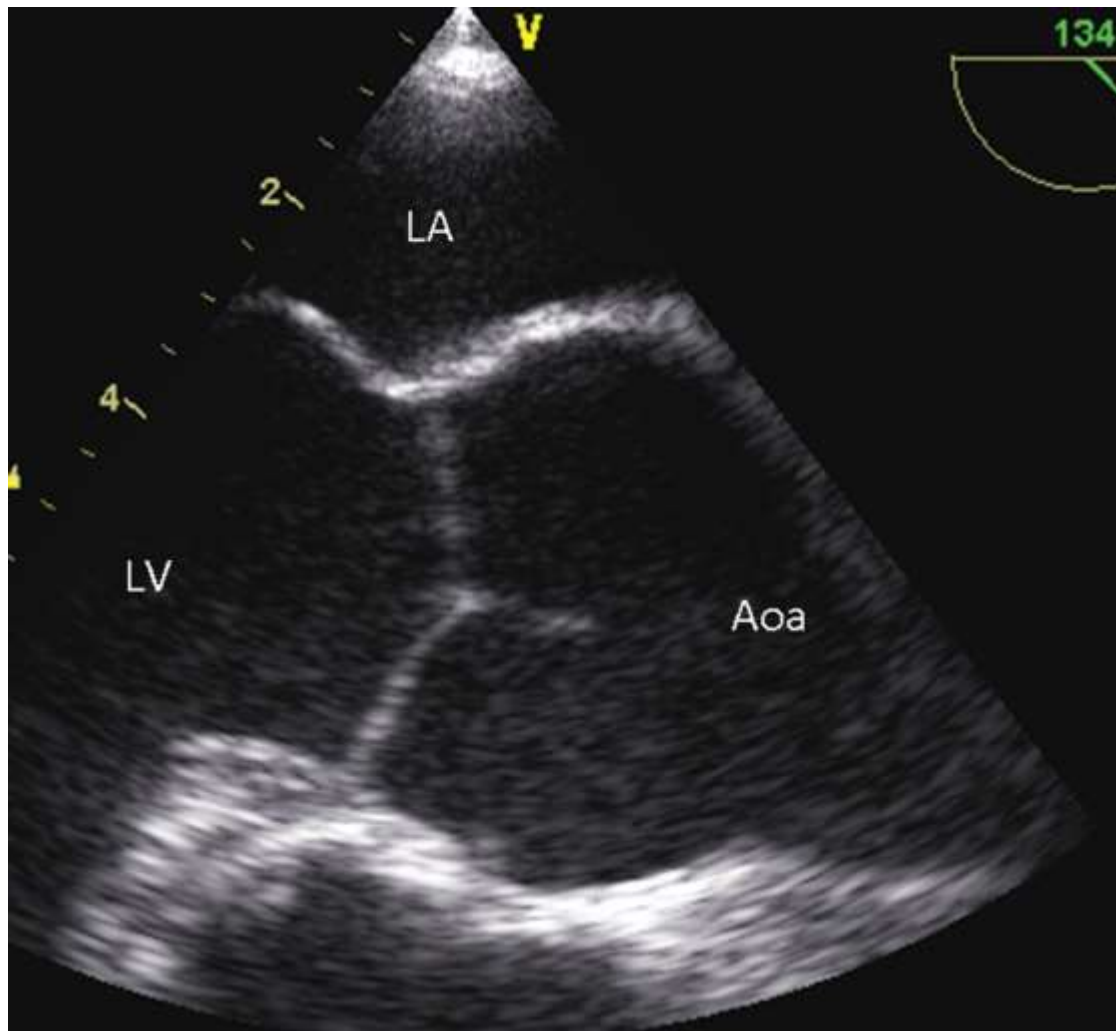
2001, képminőség

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



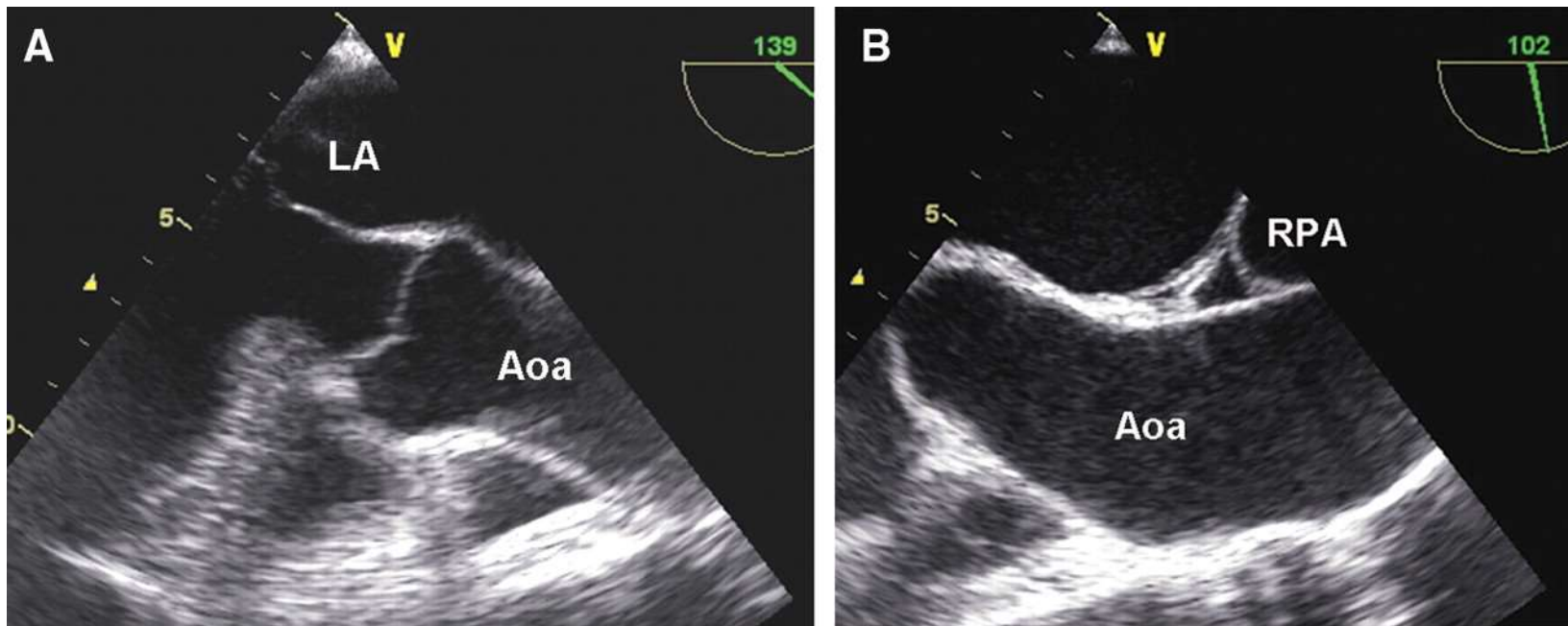
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Aortic valve long-axis view (magnification).



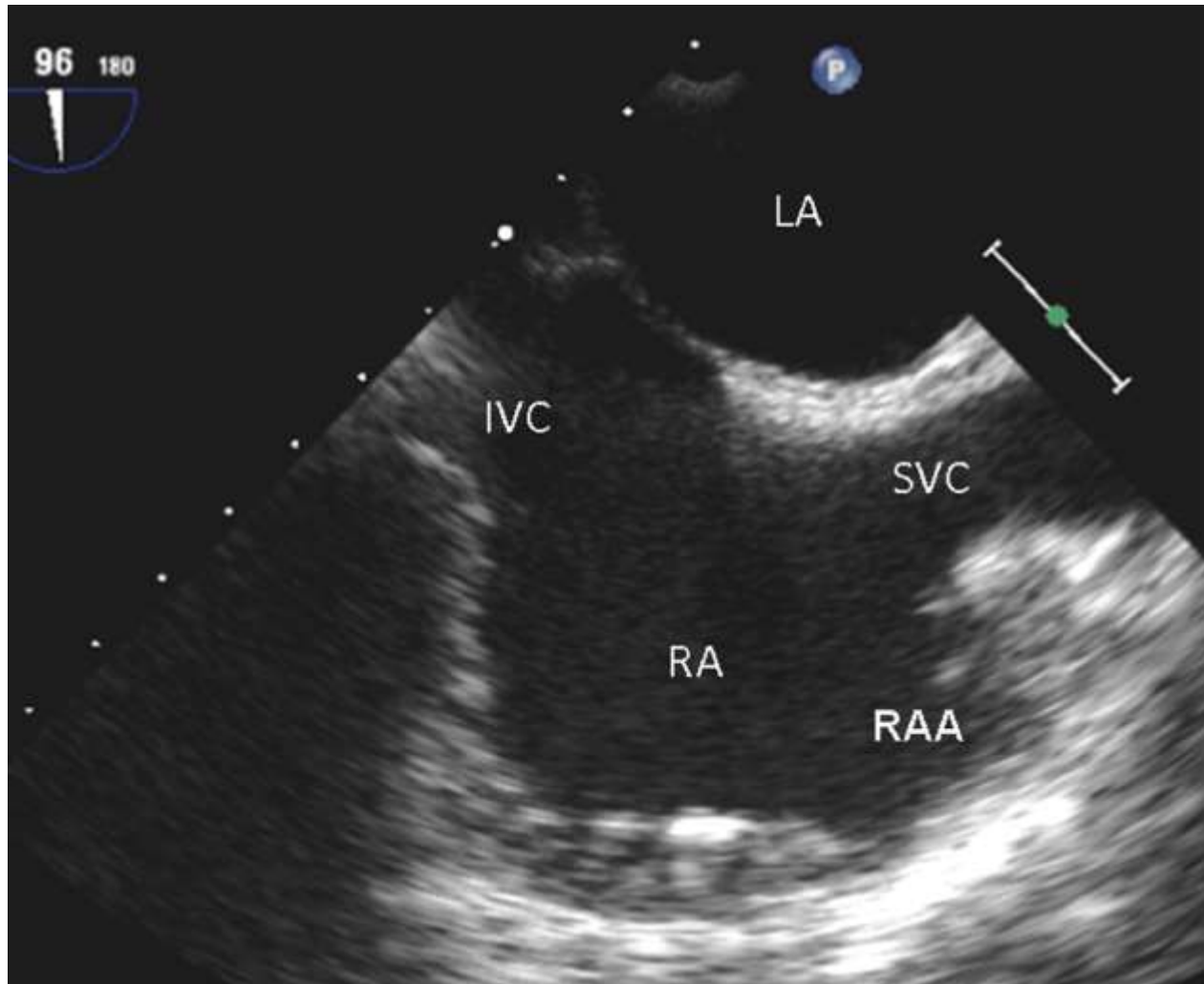
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Long-axis view of the ascending aorta.



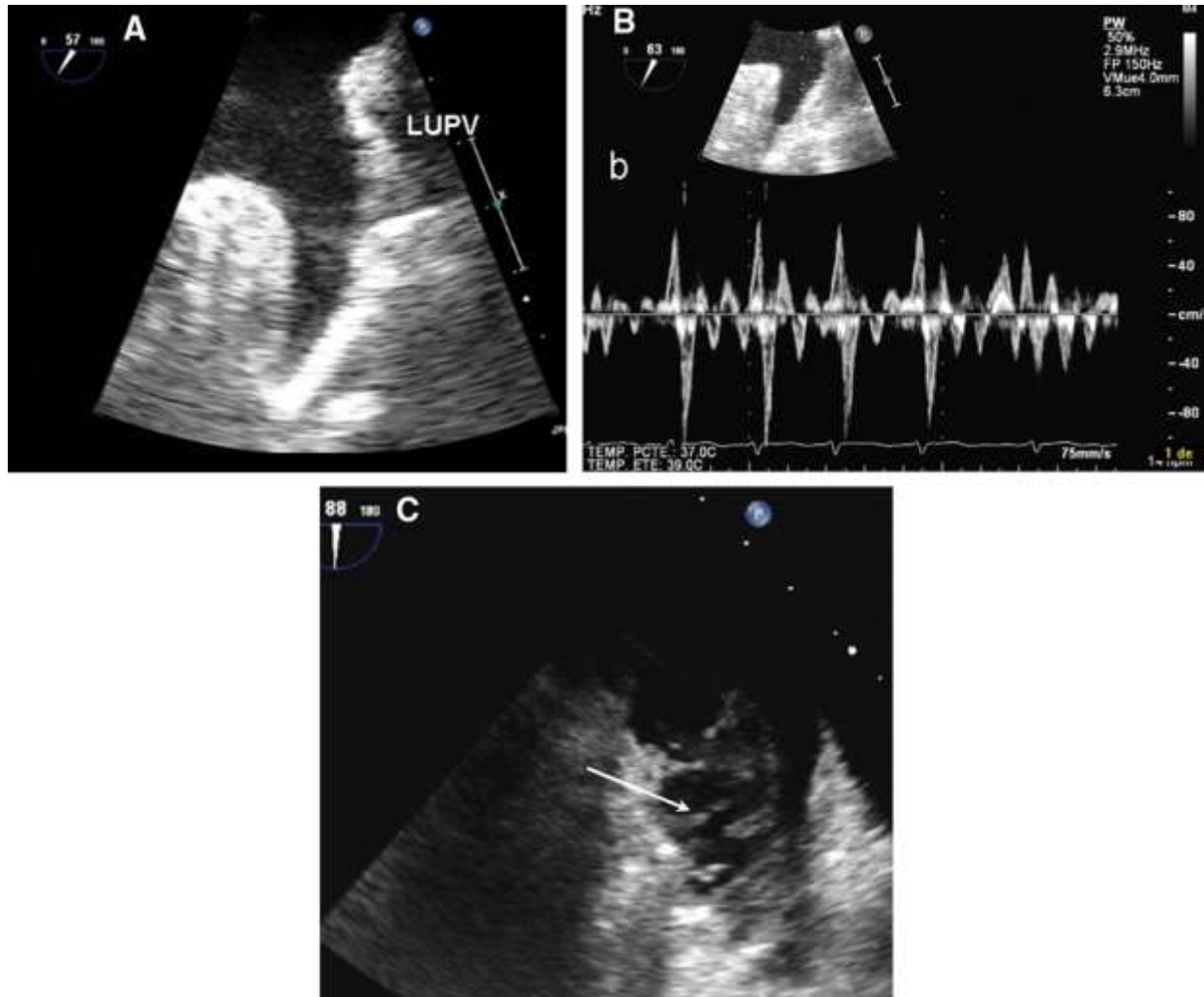
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Left and right atrium and atrial septum in longitudinal (sagittal) view.



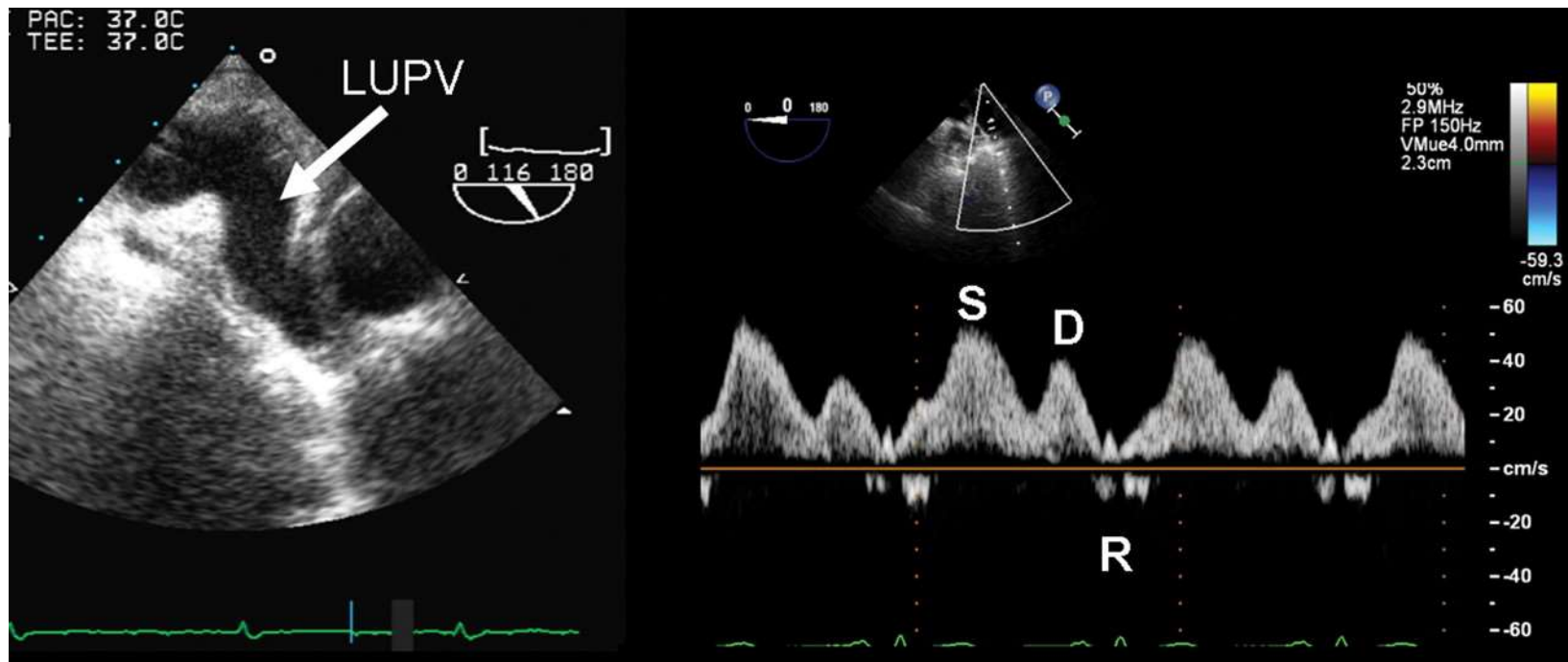
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(A) Left atrial appendage.



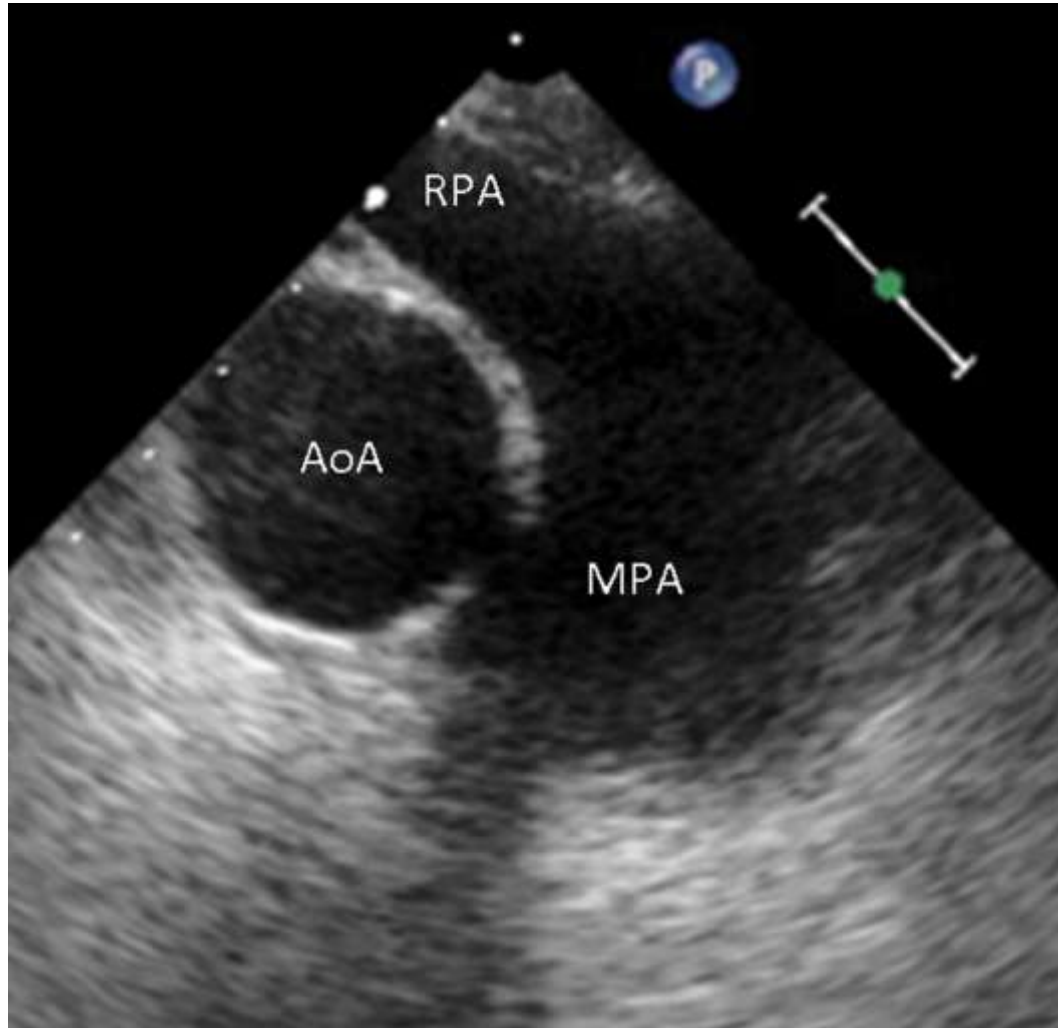
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Left: left upper pulmonary vein (LUPV) imaged in an approximately longitudinal view.



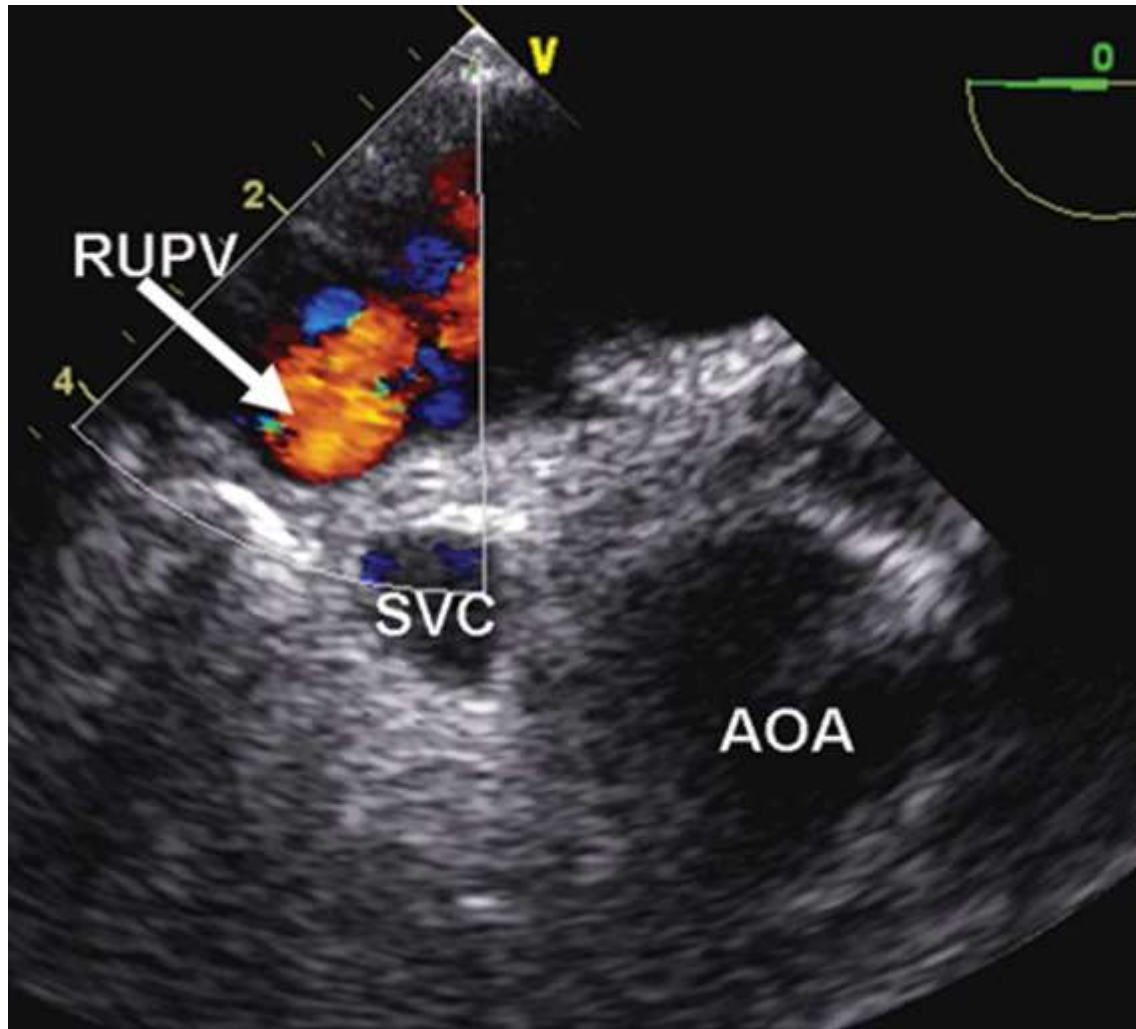
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Short-axis view of ascending aorta and main pulmonary artery (MPA), with bifurcation and origin of right pulmonary artery (RPA), from the upper transoesophageal window.



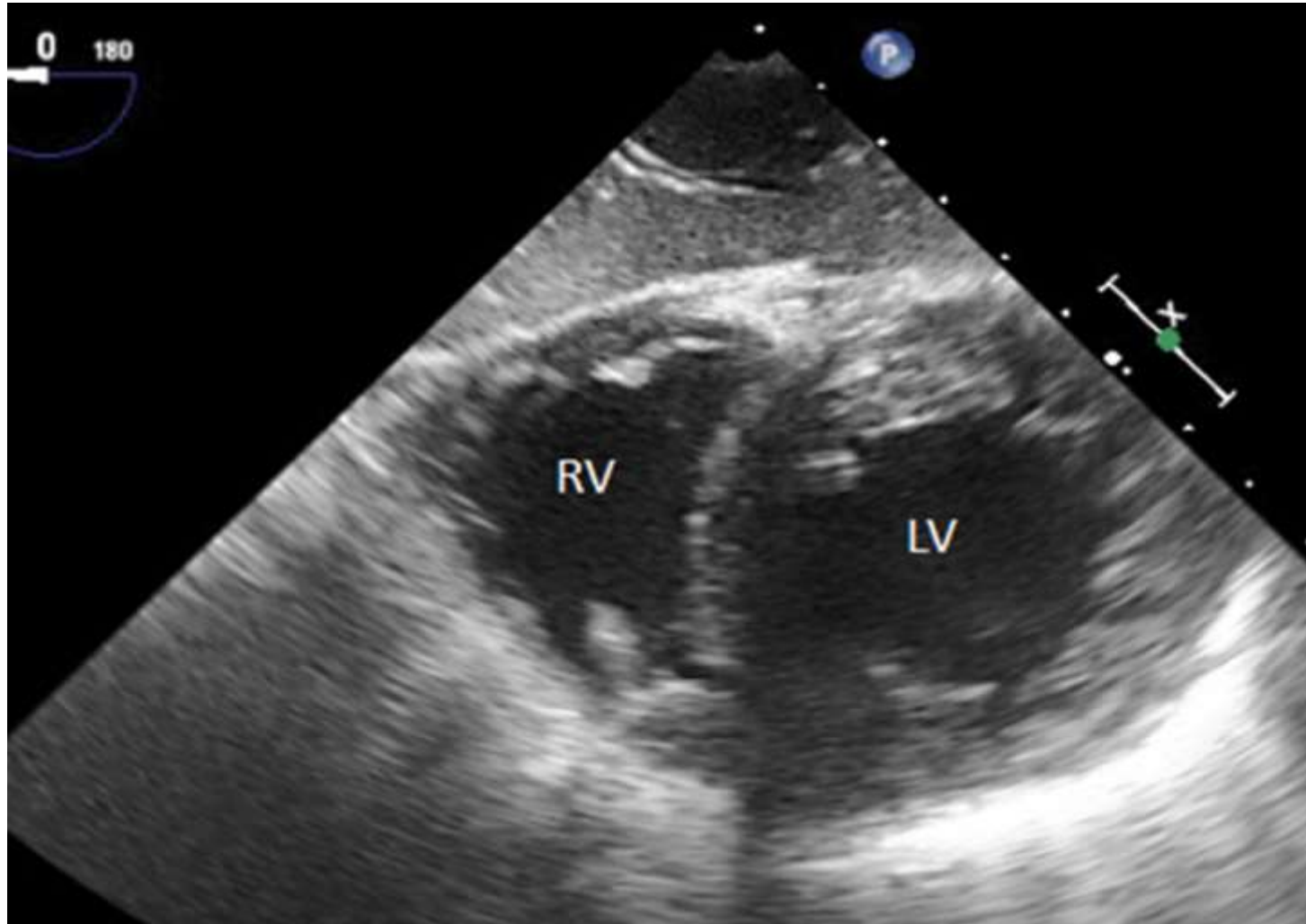
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Transverse view of upper left atrium.



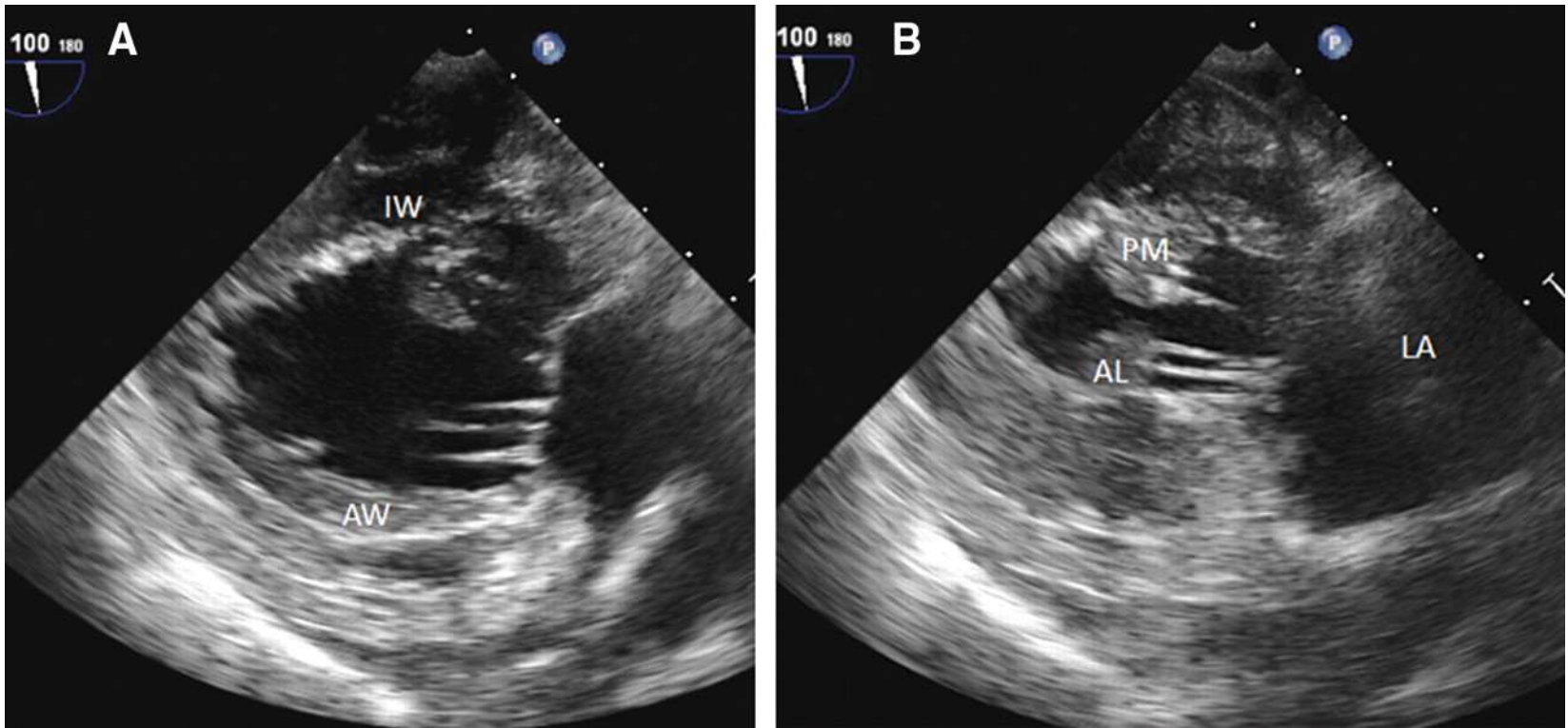
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

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



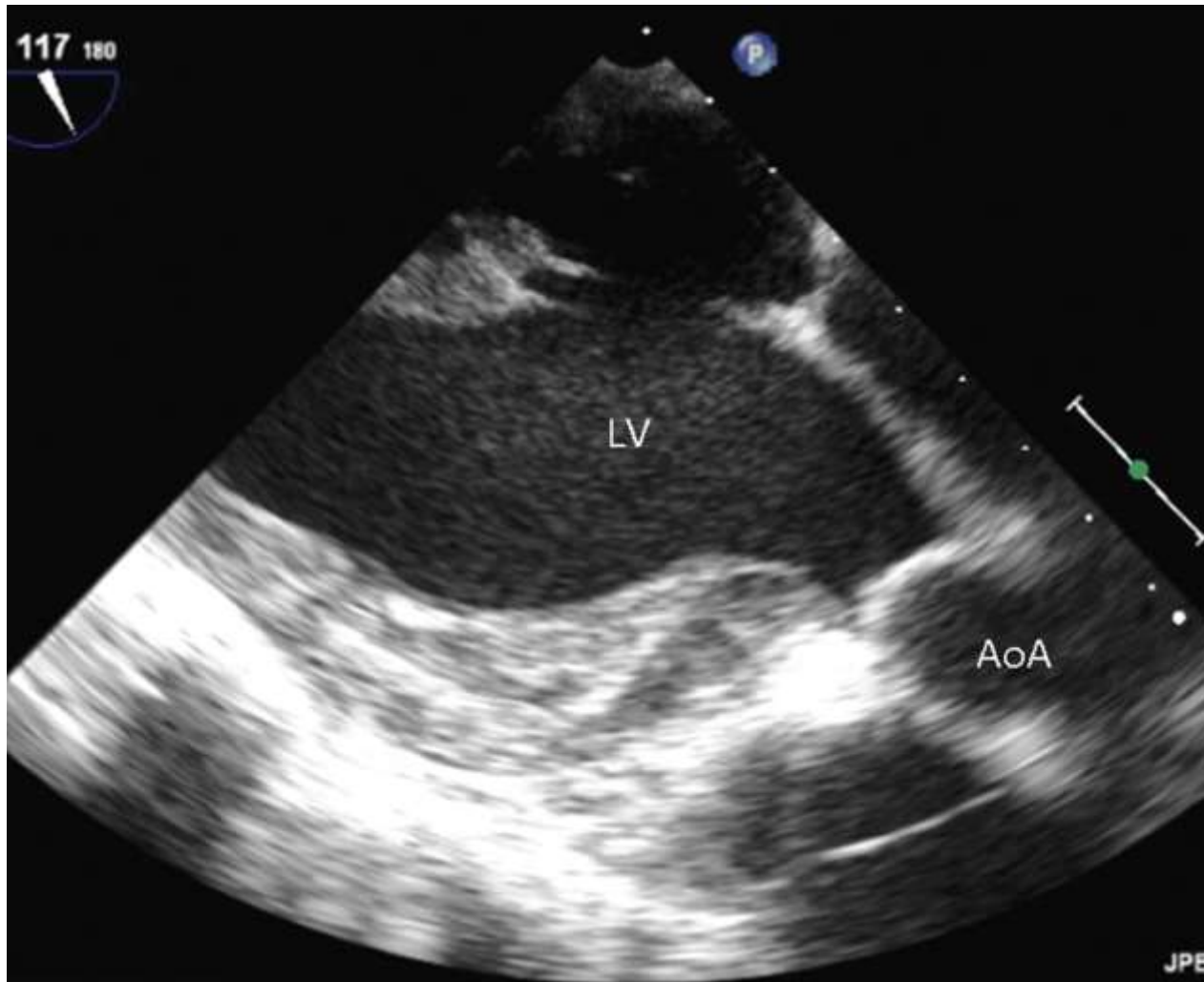
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Transgastric two-chamber view.



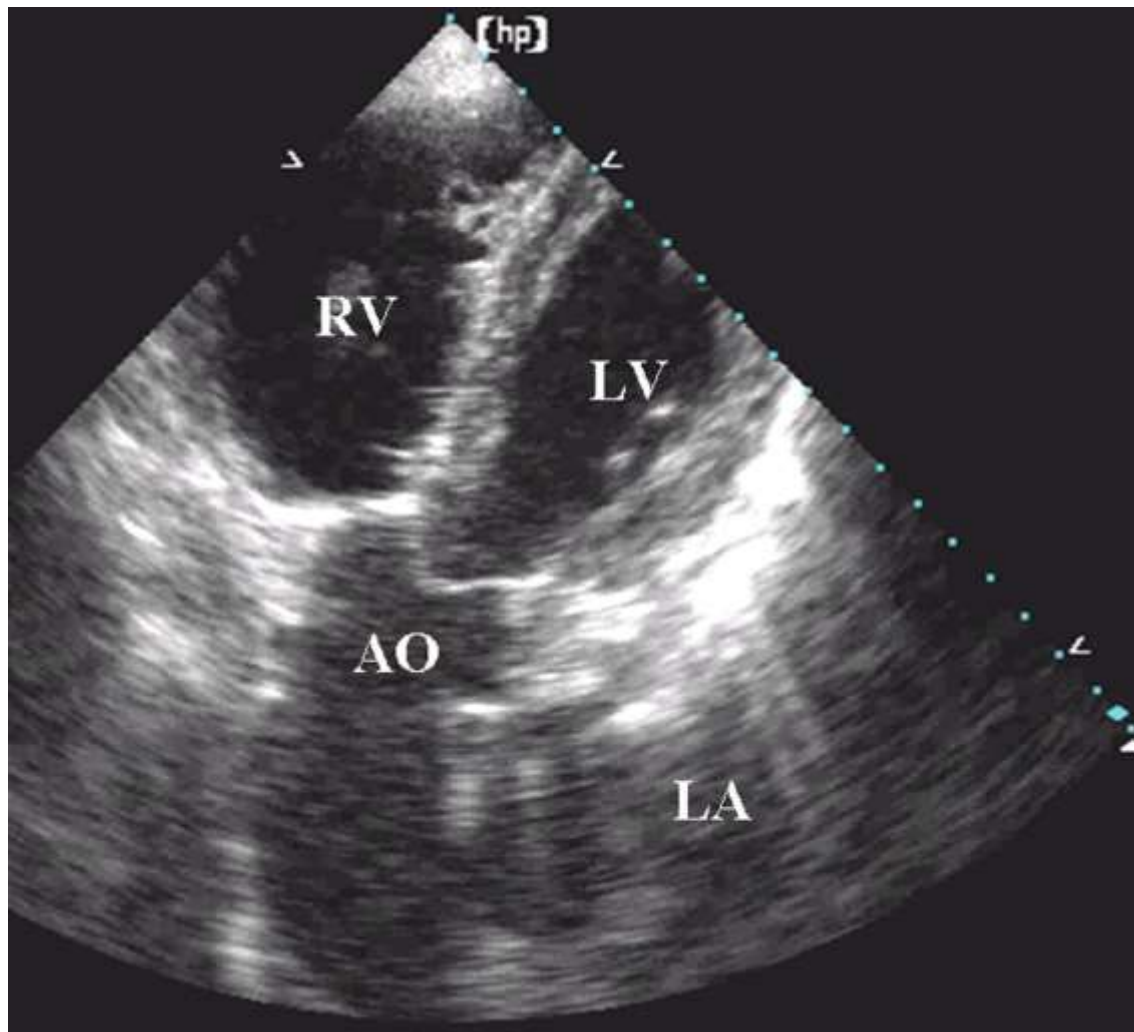
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Transgastric long-axis view of the left ventricle (117°).



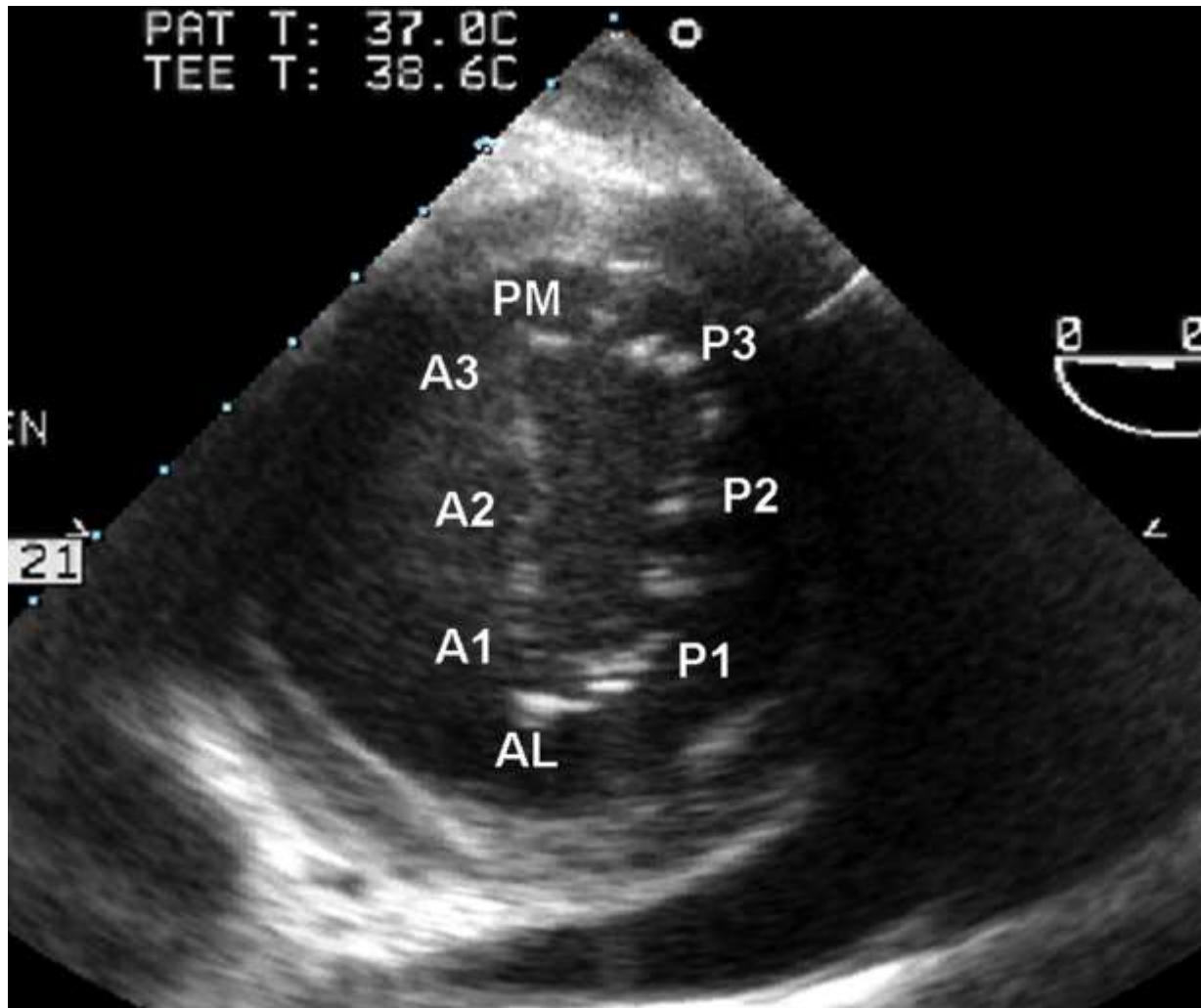
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Deep transgastric long-axis view of the left ventricle, with maximal anteflexion.



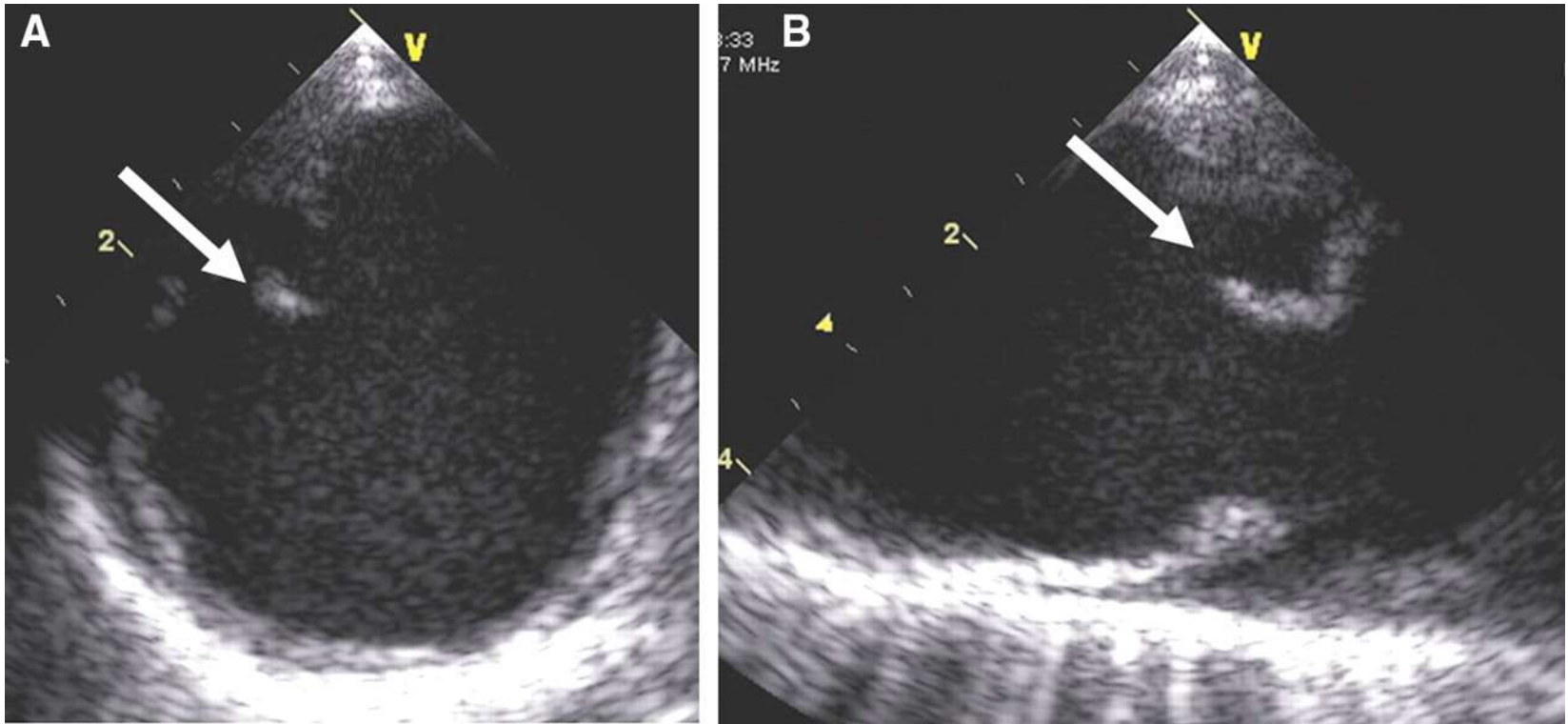
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Short-axis view of the open mitral valve from the transgastric position.



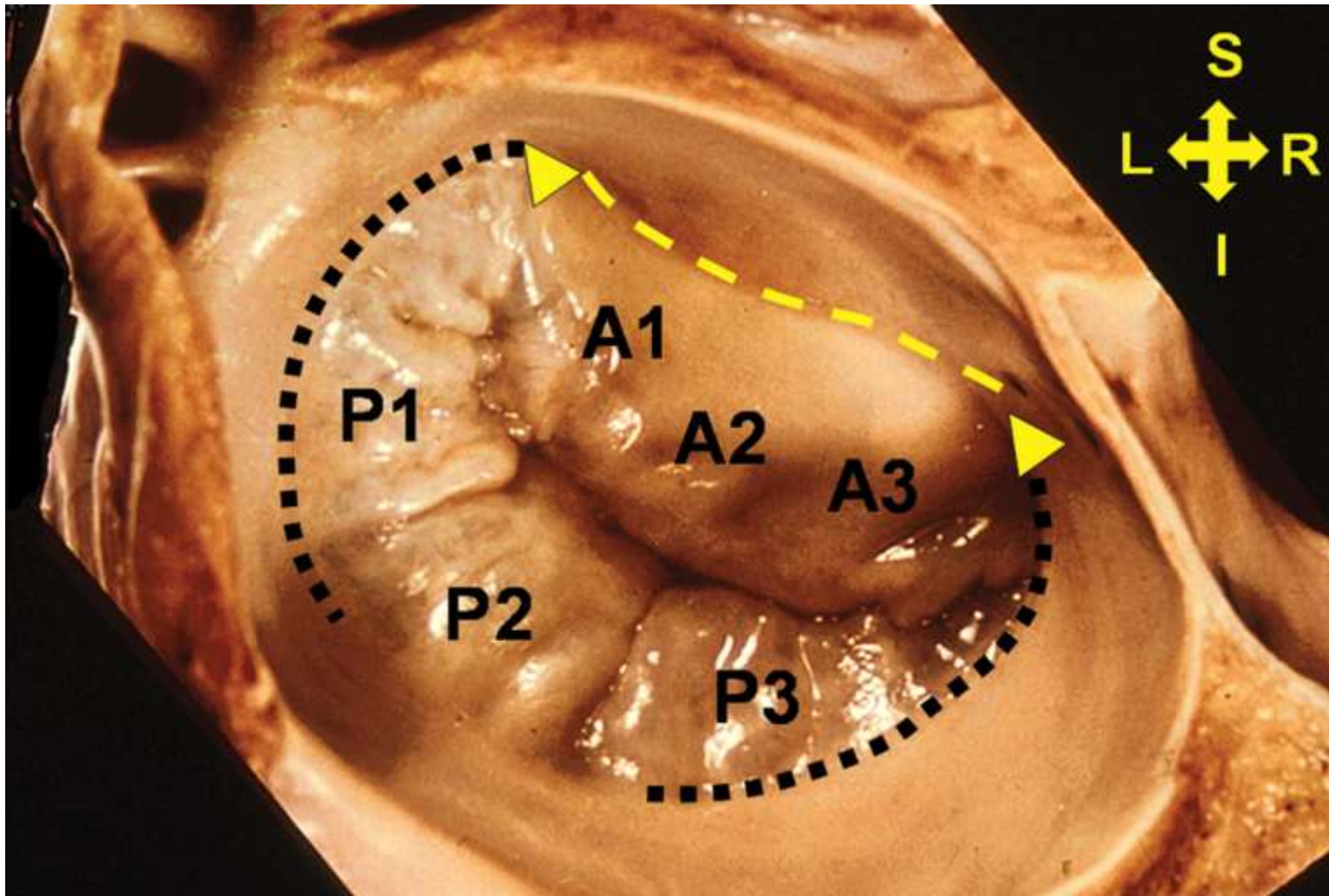
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Descending aorta: (A) short-axis view; (B) long-axis view.



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Pathologic specimen of the closed mitral valve, seen from the atrial side ('surgeon's view').



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Scallop =



cocotte

„Römertopf”

fésűskagyló



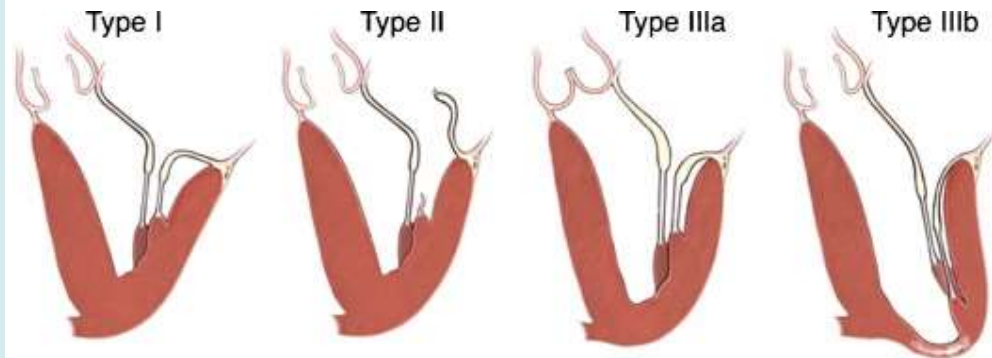
Anachlamys flabellata
fr. *escalope*



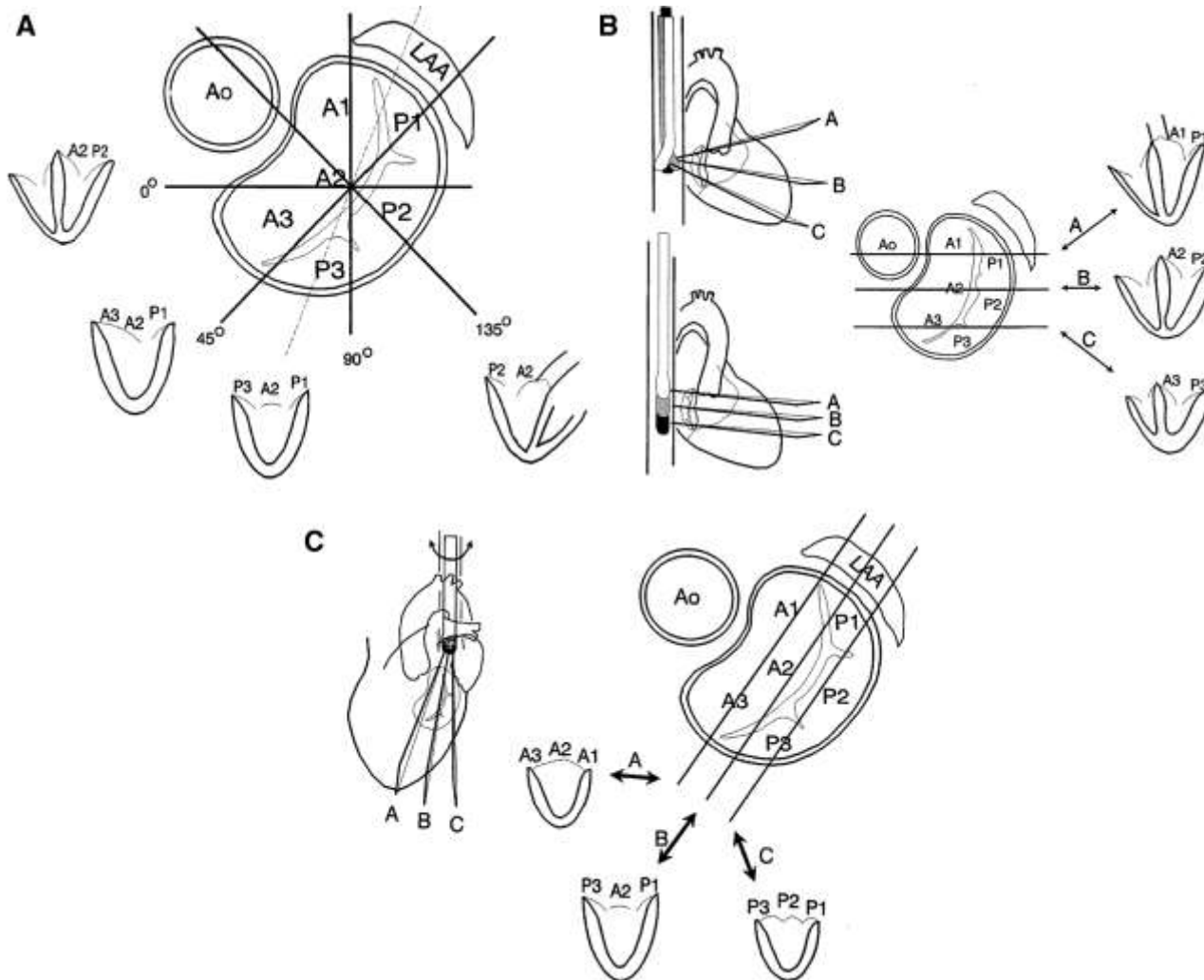
~100 szem

Carpentier classification and mechanism of mitral regurgitation

Carpentier classification	Definition	Differential diagnosis
Type 1	Normal leaflet mobility	Annular enlargement; perforated leaflet; congenital cleft; annular calcification
Type 2	Increased mobility ('prolapse'); includes 'flail leaflet'	Elongated cords; ruptured cords; excessive leaflet tissue
Type 3	Restricted mobility; during diastole (3A); during systole (3B)	Thickened, rigid leaflets; commissural fusion; shortened or fused tendinous cords; dilated left ventricle with impaired function

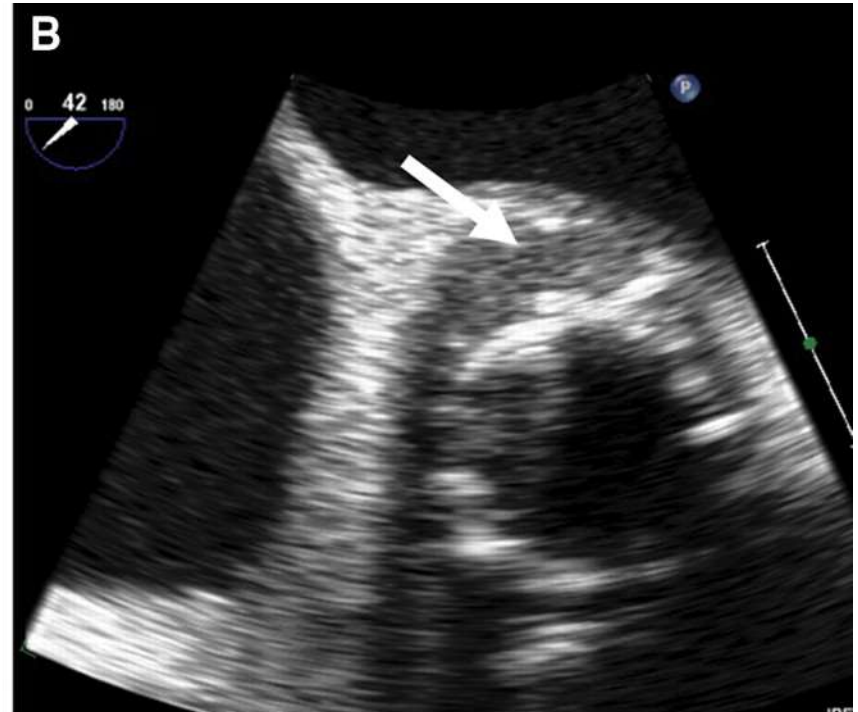
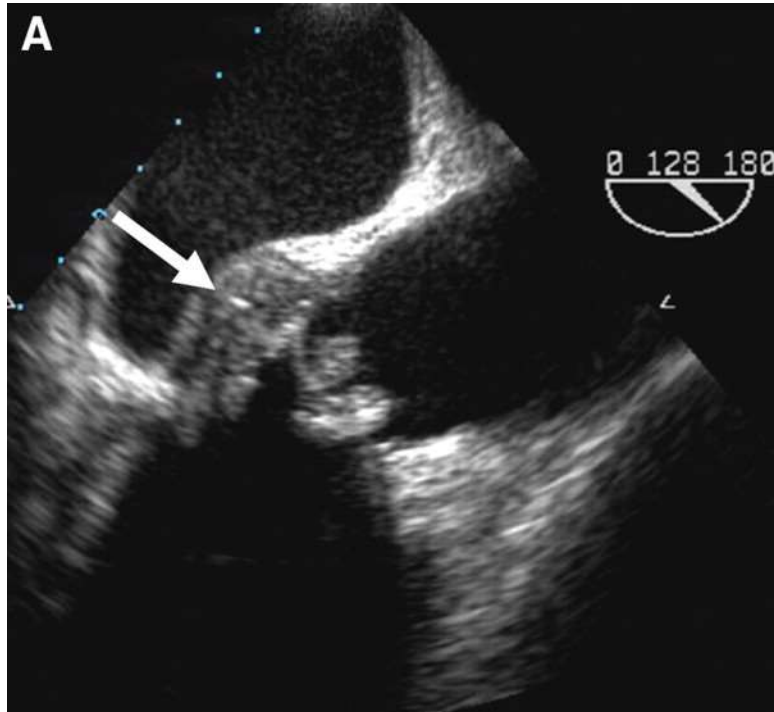


Examination of the mitral valve.



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Infective endocarditis of bioprosthesis in aortic position, with paraprosthetic abscess characterized by aortic wall thickening with central zone of reduced reflectivity (arrows).



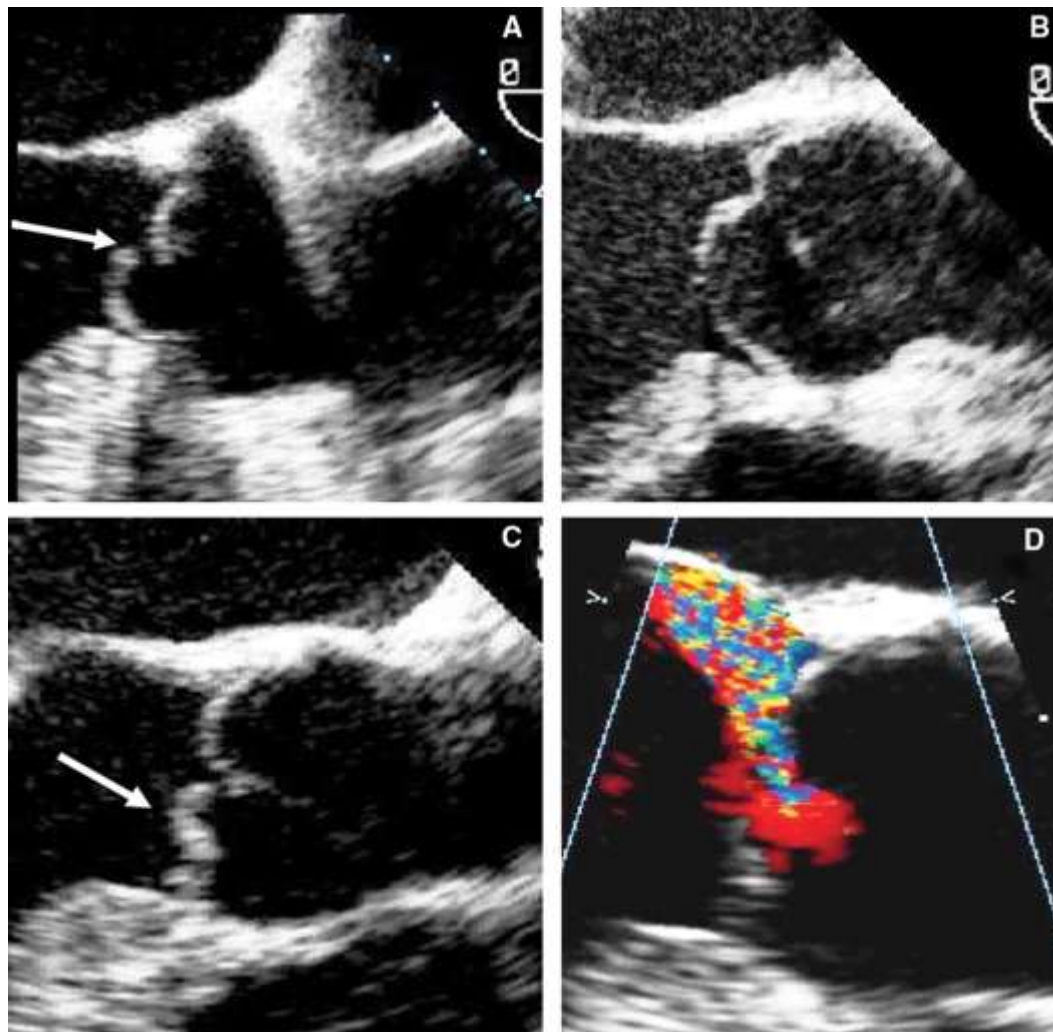
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Subvalvular aortic stenosis due a subaortic membrane.



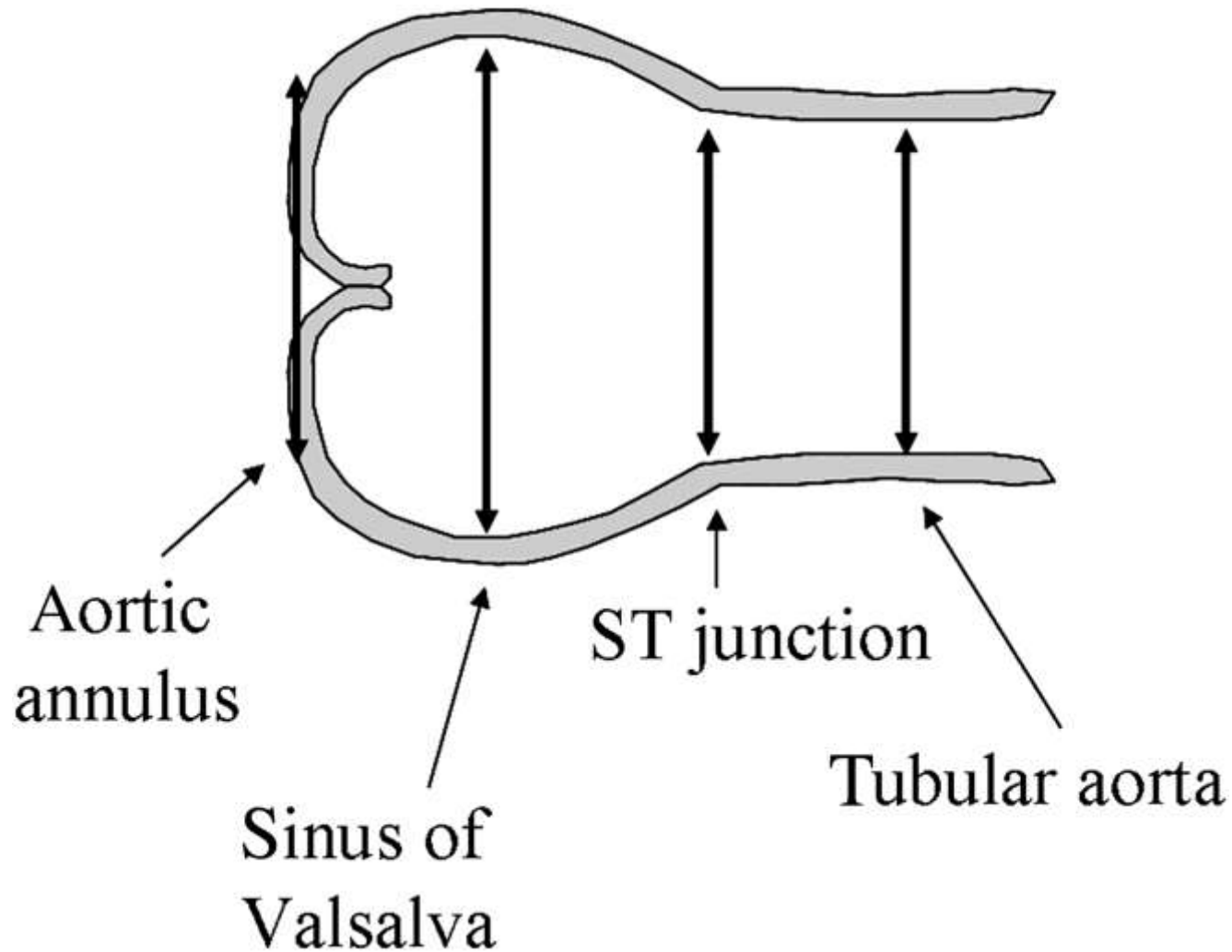
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Prolapse and flail of the aortic valve; long-axis views.



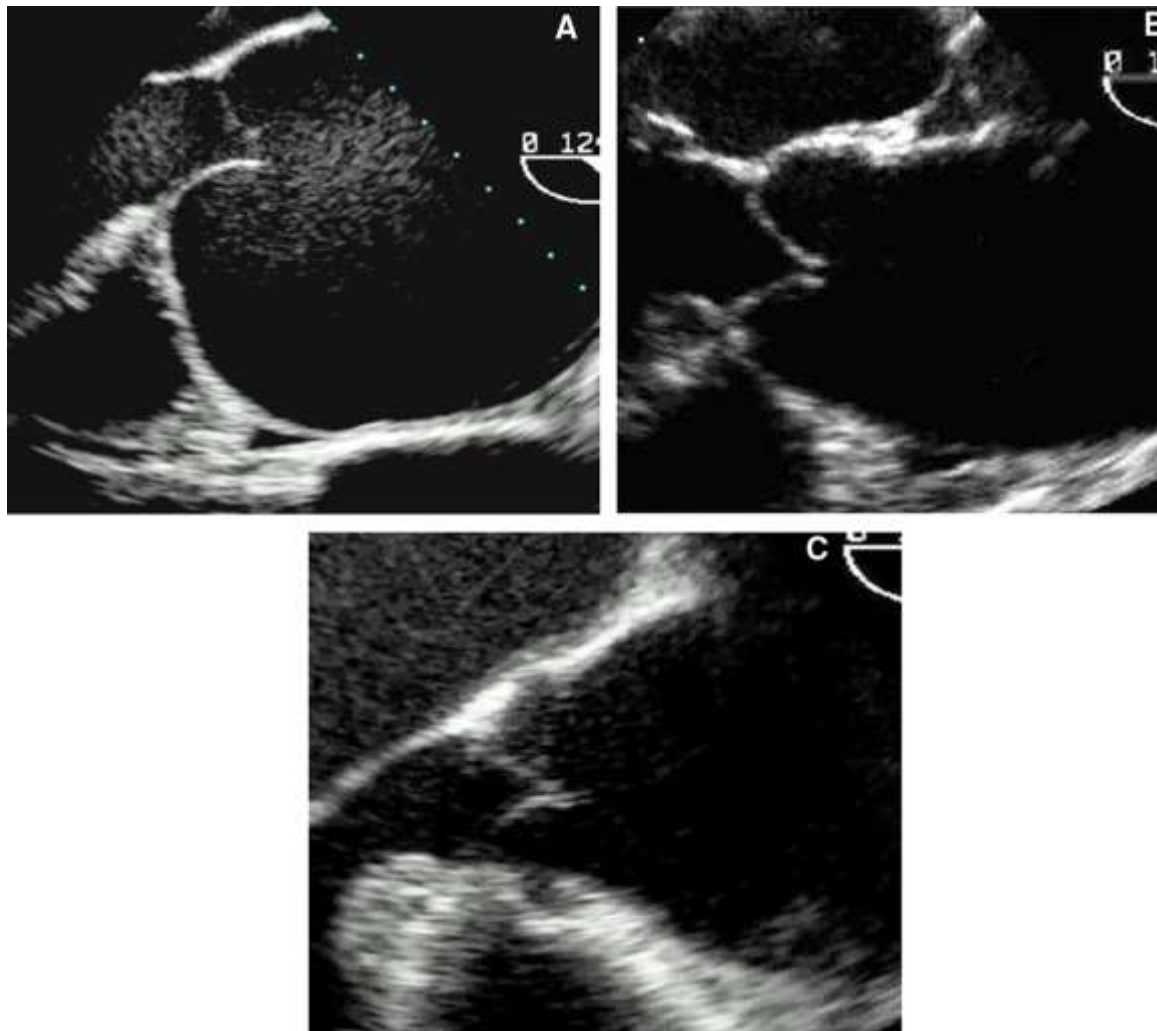
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Typical measurements of the aortic root apparatus.



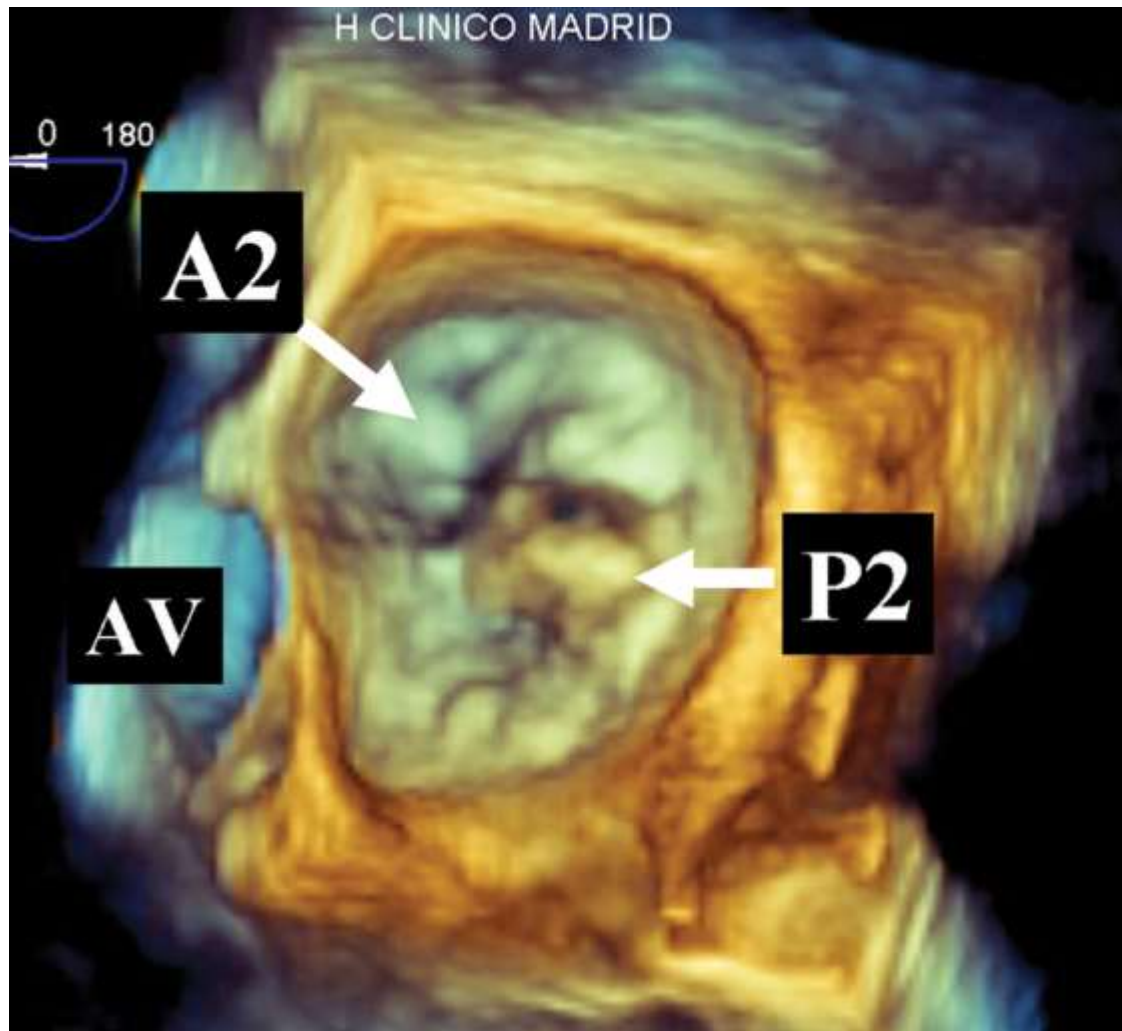
Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

(A) Dilatation of the sinus of Valsalva.



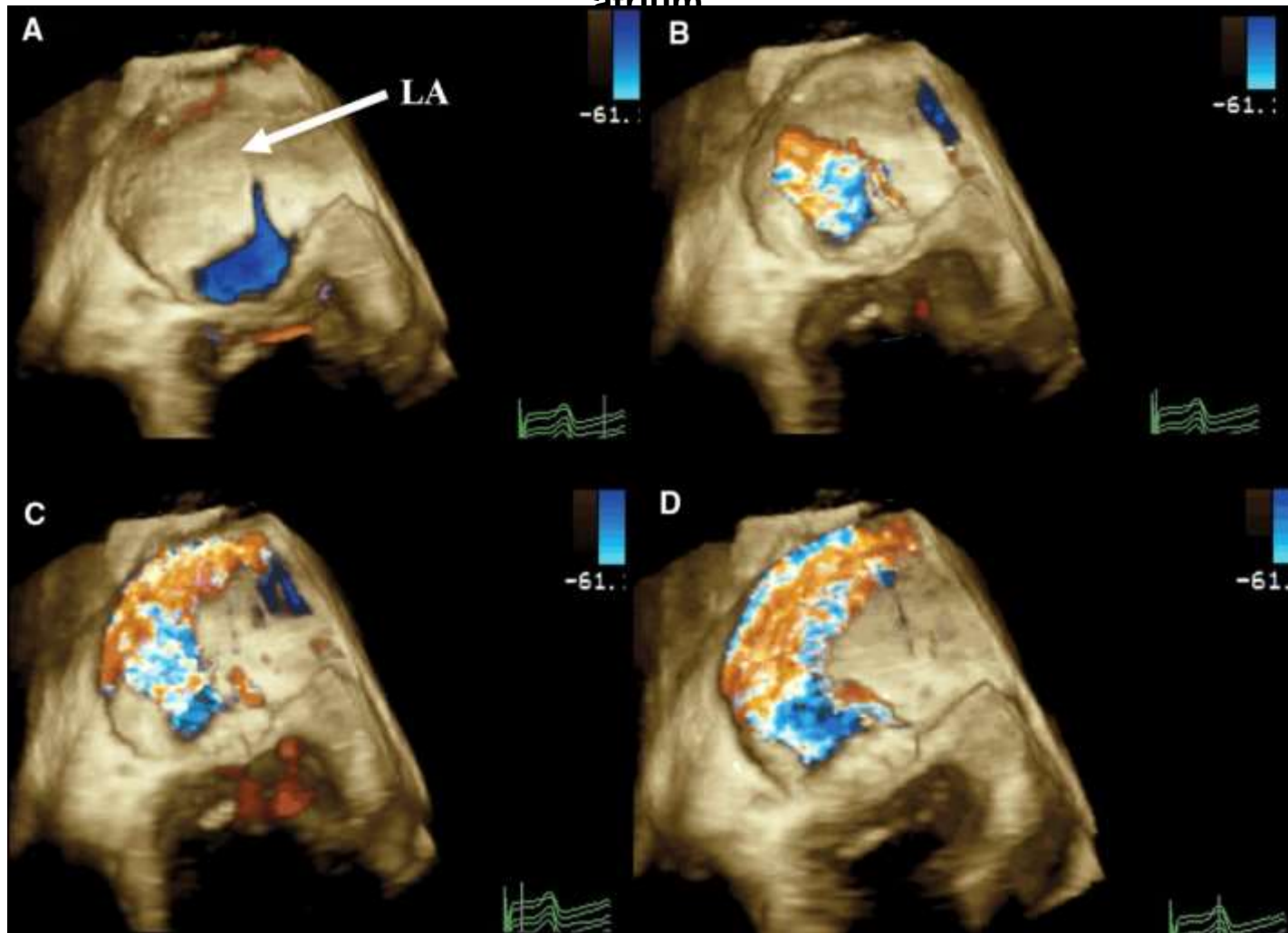
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3D transoesophageal en face view of the mitral valve with a P2 prolapse, seen from a left atrial viewpoint (3D zoom).



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3D transoesophageal view of the jet of severe mitral regurgitation due to posterior mitral prolapse, seen from a left atrial perspective ('full volume', colour Doppler mode); LA, left atrium

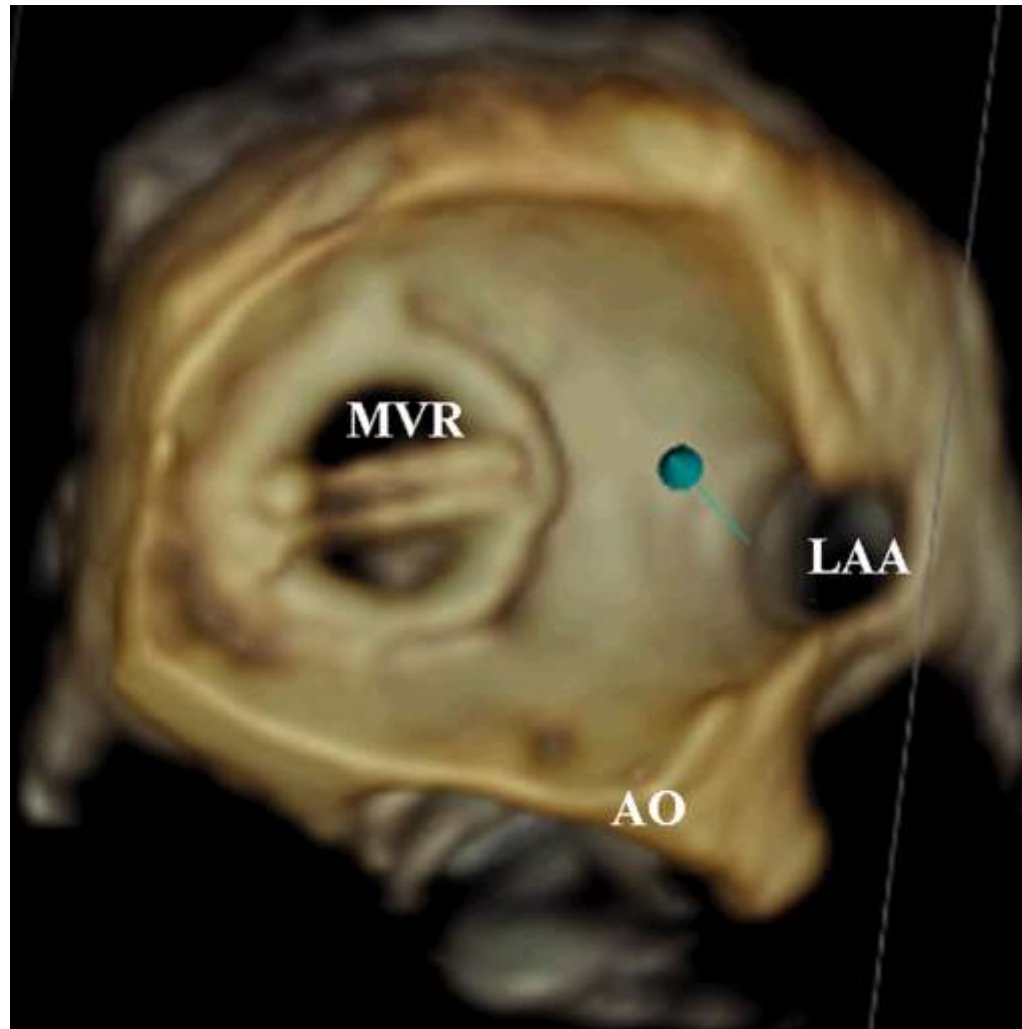


Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Practice Guidelines for Perioperative Transesophageal Echocardiography

*An Updated Report by the American Society of Anesthesiologists and the Society of Cardiovascular Anesthesiologists Task Force on Transesophageal Echocardiography**

3D transoesophageal view of bileaflet mitral prosthesis from the atrium; the discs are in the open position.



Flachskampf F et al. Eur J Echocardiogr 2010;11:557-576

Virtuális TEE, síkok, metszetek, Toronto

http://pie.med.utoronto.ca/TEE/TEE_content/TEE_standardViews_intro.html#quickstart

TEE guide flash

http://pie.med.utoronto.ca/TEE/TEE_content/assets/applications/TEE-cheat-sheet/index.htm

