Academy

LEVEL 3

Reconstruction of the Aortic Valve and Root: A practical approach

Essentials of intraoperative TEE

Dr. med Klaus Hoffmann

Opponents

Or

Team ?

echocardiographist

cardiac surgeon

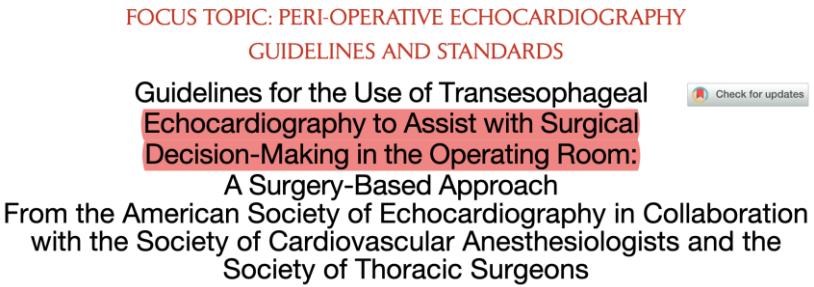
Role of Intraoperative TEE

(1) confirm and refine the preoperative diagnosis

(2) detect new or unsuspected pathology

(3) adjust the anesthetic and surgical plan

(4) assess the results of the surgical intervention



(Nicoara et al, J Am Soc Echocardiogr 2020;33:692-734.)

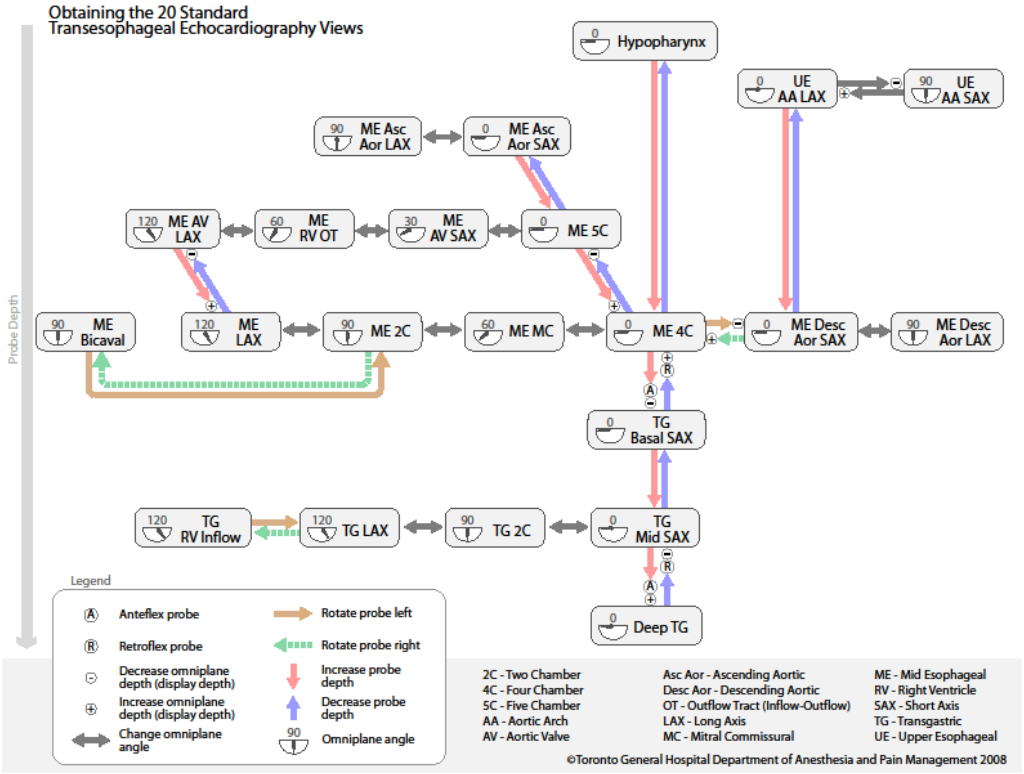
First Step Towards Success: Interdisciplinary Interaction Before Surgery

Two goals: A) obtain a solid work hypothesis

B) define any open questions

→ Communicate ! (using the same terminology)

Full protocol?



30 to 45 minutes!

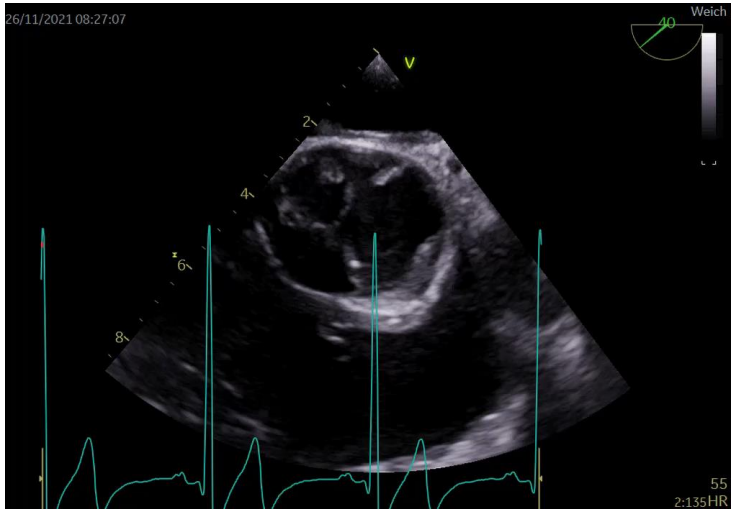
How to Obtain the ***Essential*** Information ?

- Relevant views and examinations
  with a pragmatic protocol (<10 minutes)

→ • Four 2D views

→ • One 3D sample

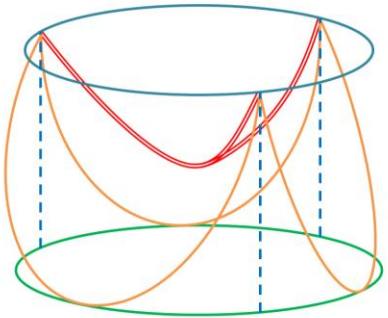
First view: ME AV SAX

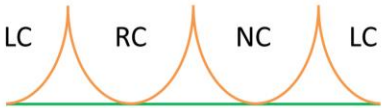


- What valve type ?
- If BAV, what is the commisural orientation?
- Jet origin: central or pericentral?

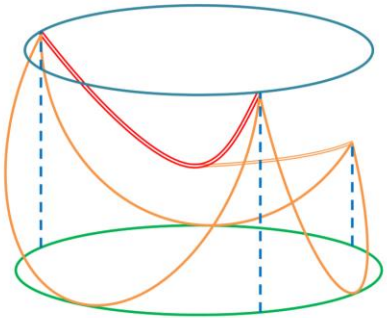
First view: ME AV SAX
valve type

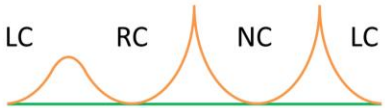
Tricuspid aortic valve



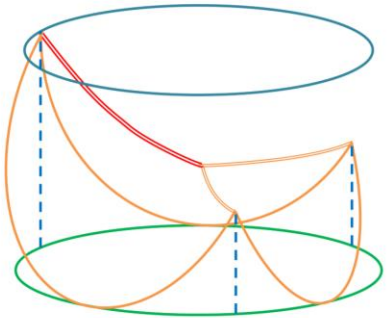


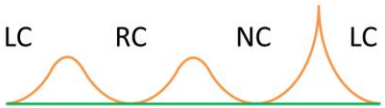
Bicuspid aortic valve





Unicuspid aortic valve

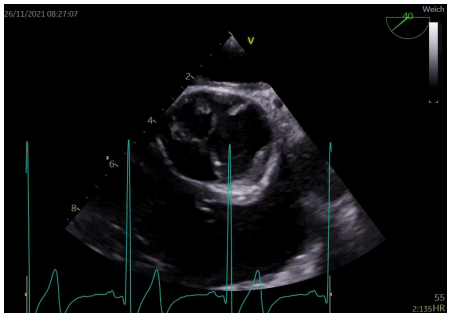




First view: ME AV SAX
valve type

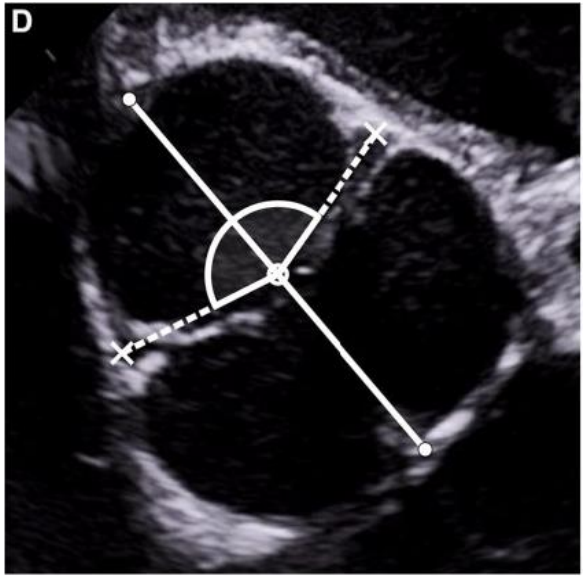
TAV

BAV



UAV

First view: ME AV SAX
BAV commisural orientation



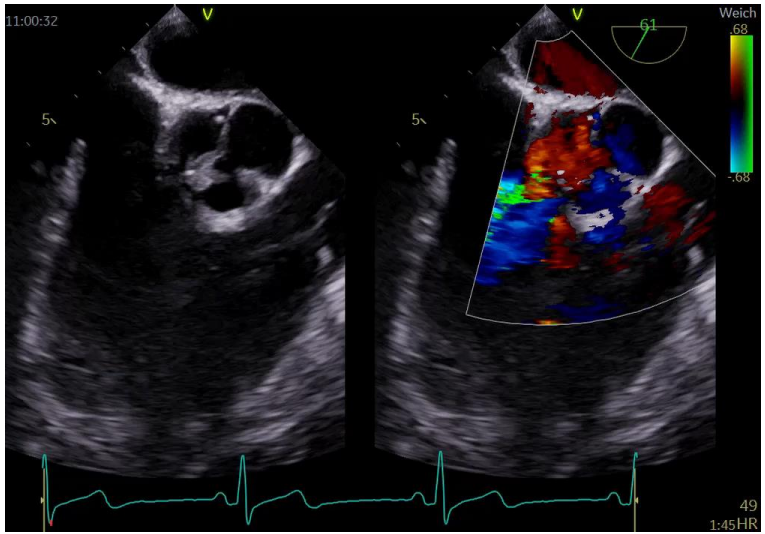
geometric centre =>Central line, cut in half

angle => lines drawn from geometric centre
through the 2 functional commisures

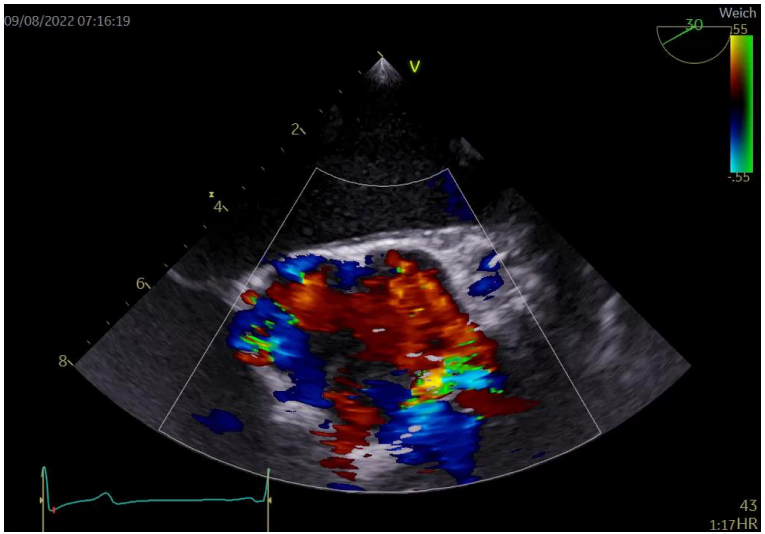
Froede et al Eur J Cardiothorac Surg 2020 Dec 1;58(6):1153-1160

First view: ME AV SAX
Jet origin

central



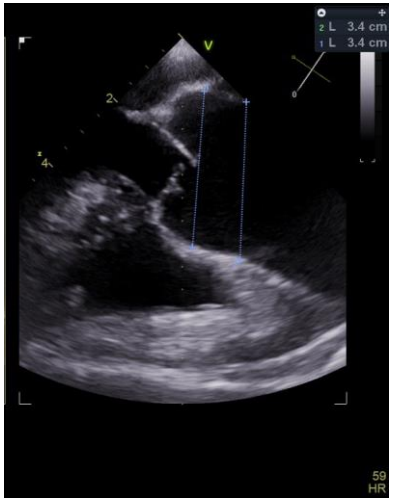
pericentral



2nd and 3rd view: ME AV X-plane + LAX root dimensions

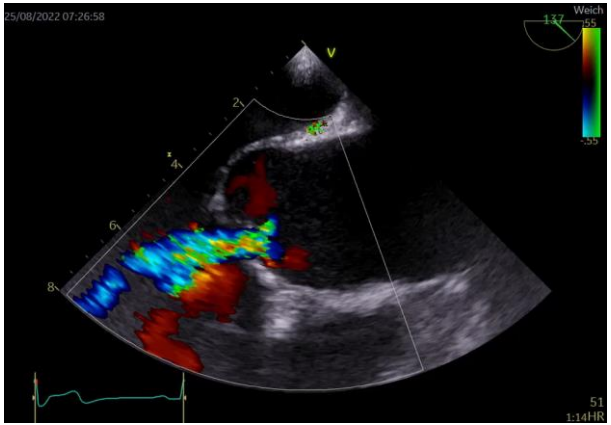
- Annulus in systole

- All other measurements in diastole

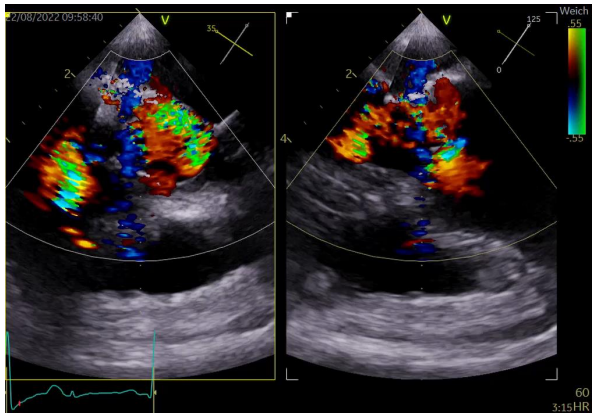


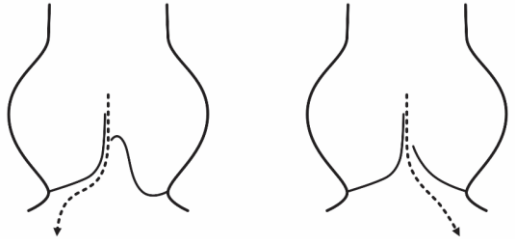
Second and third view: ME AV X-plane + LAX jet direction

central



Eccentric
= eccentric cusp disease



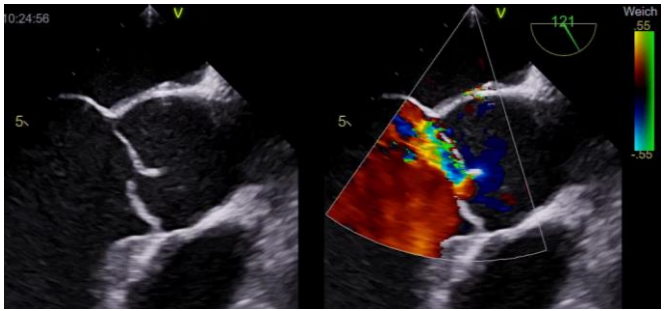


Prolapse

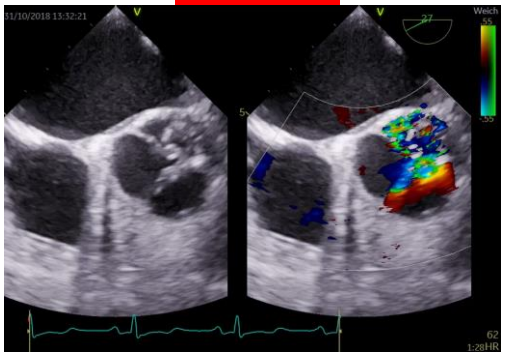
Retraction

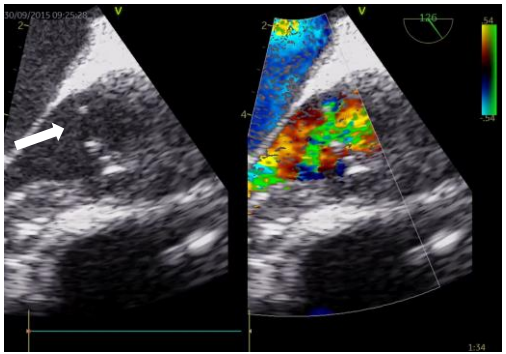
First 3 views: mechanism of regurgitation selection of repairable substrate

Prolapse



Calcium

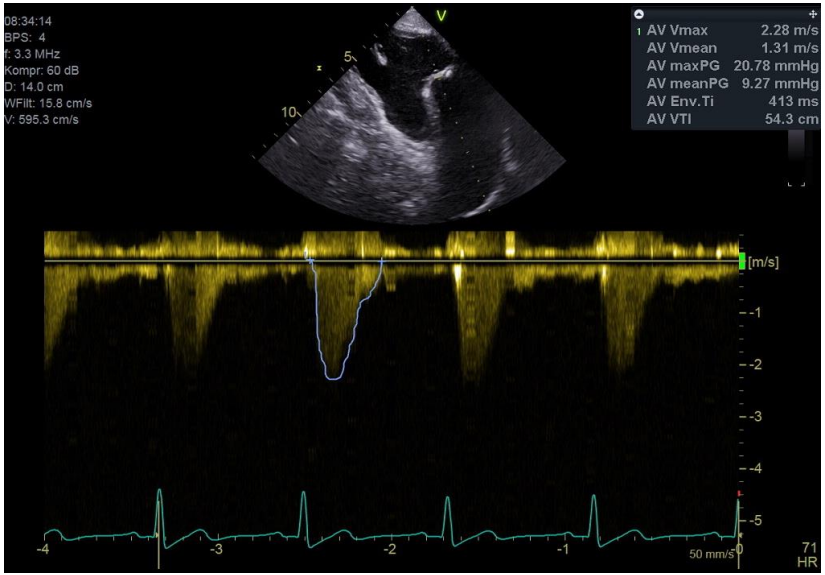


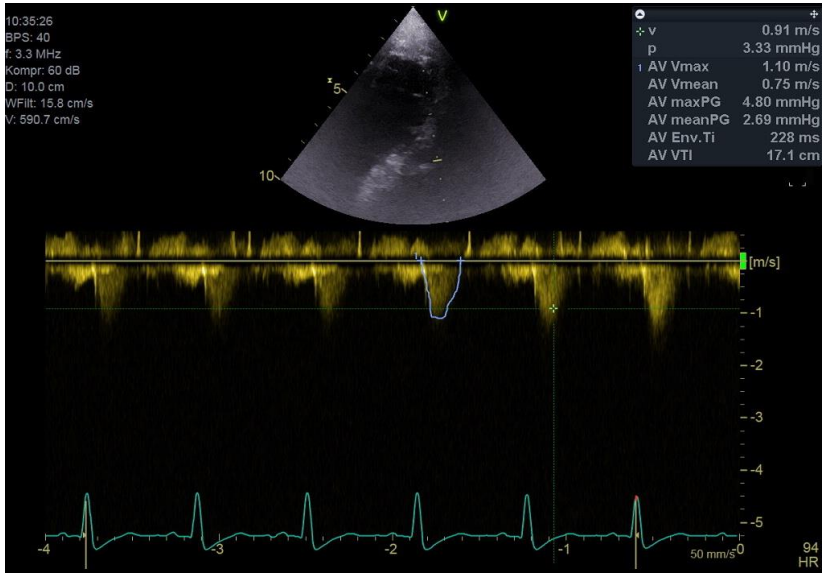


Perforation

Vegetations

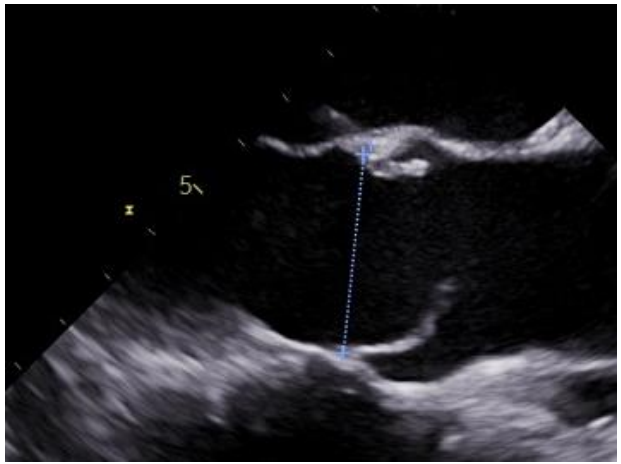
Fourth view: deep TG 5 chamber or TG LAX transvalvular gradient





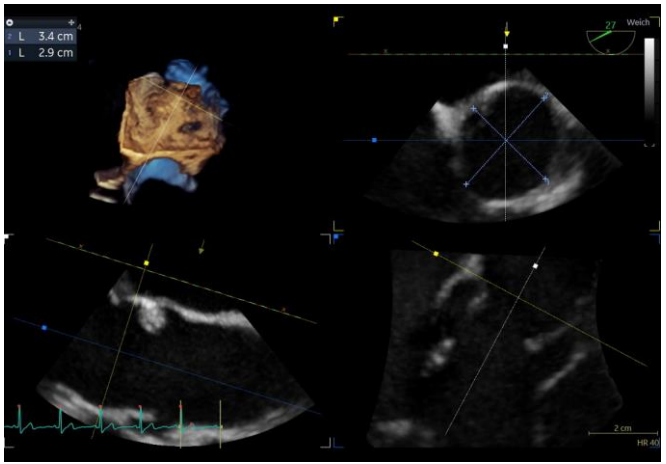
3D sample (work in progress)
Double check of 2D measurements

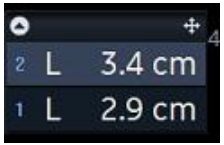
2D AV LAX



Annulus
in
systole

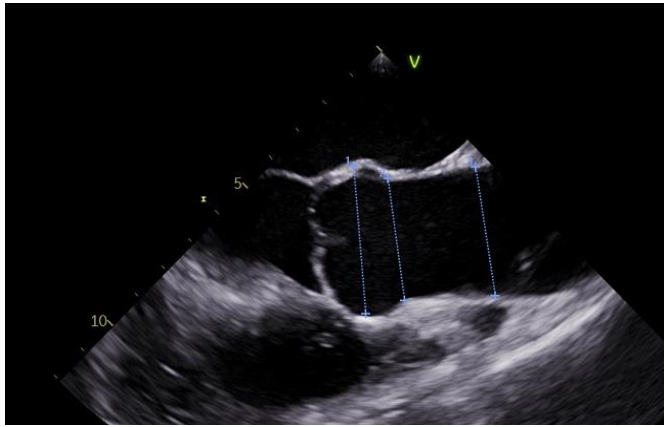
3D





3D sample (work in progress)
Double checking 2D measurements

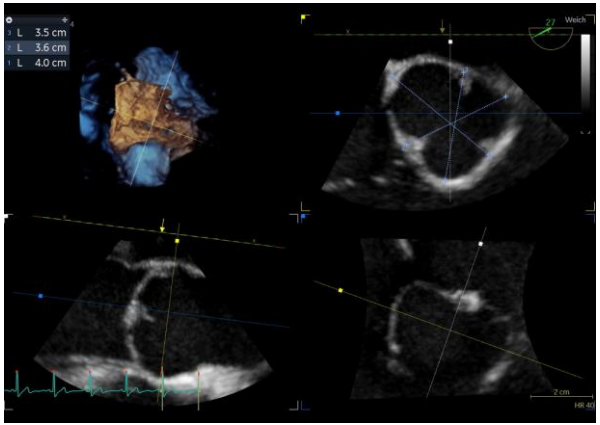
2D AV LAX



3	L	3.4 cm
2	L	3.2 cm
1	L	3.8 cm

Sinus
ST junction
Tubular aorta
In
Diastole

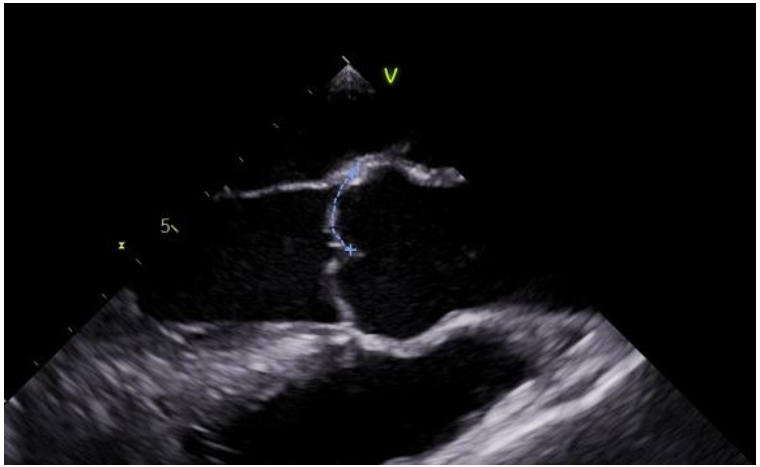
3D

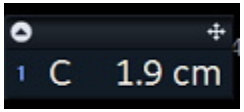


3	L	3.5 cm
2	L	3.6 cm
1	L	4.0 cm

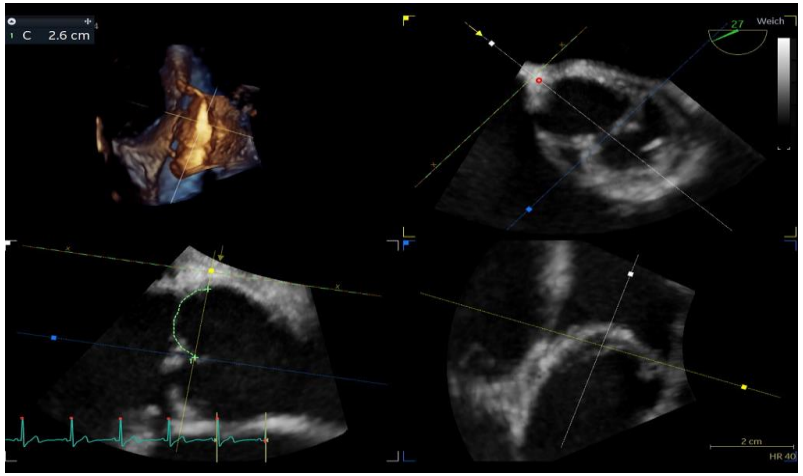
3D sample (work in progress)
gH of the non-fused cusp

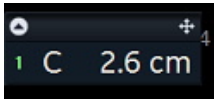
2D AV LAX



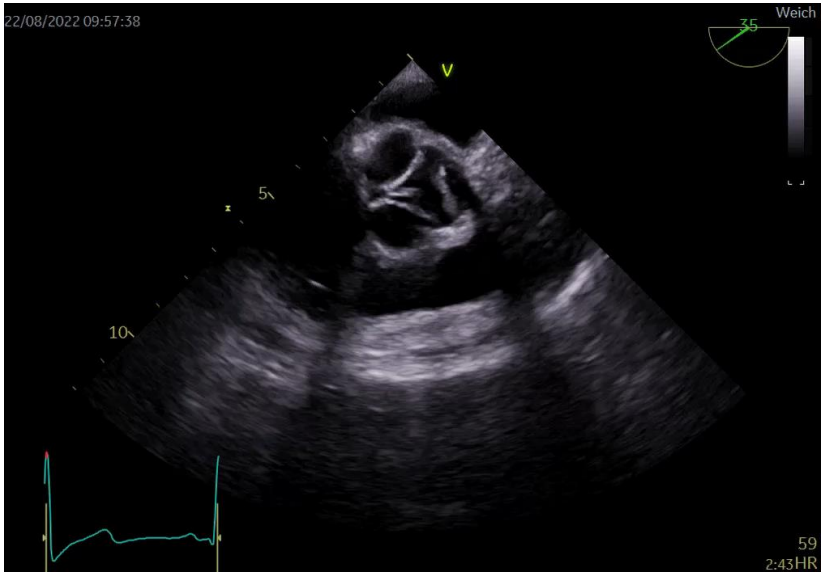


3D





Example 1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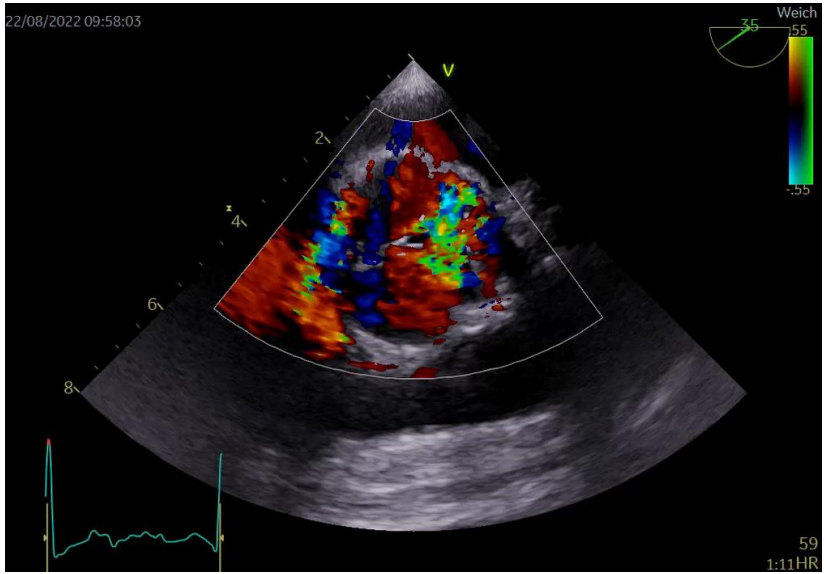
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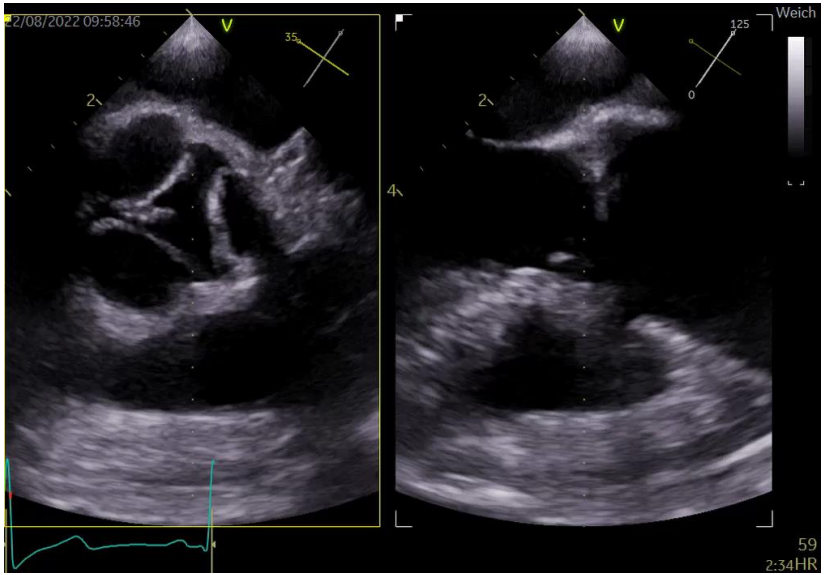
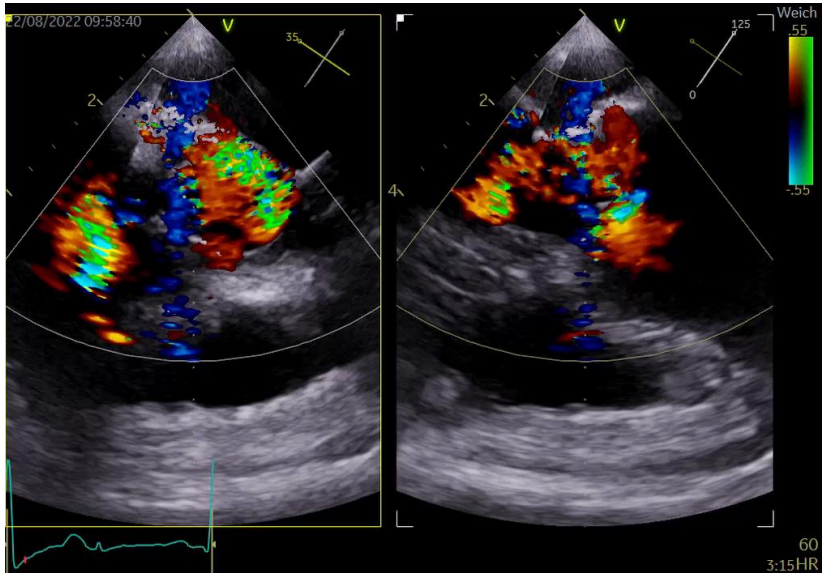
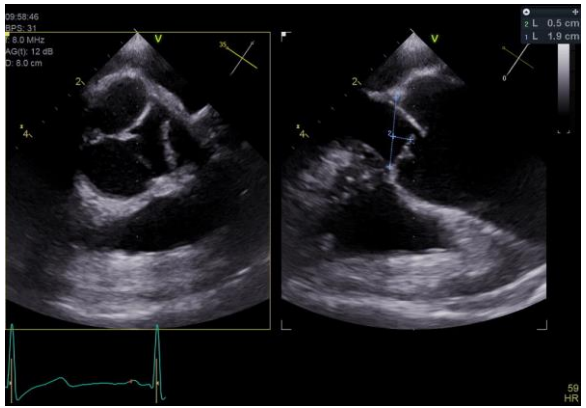
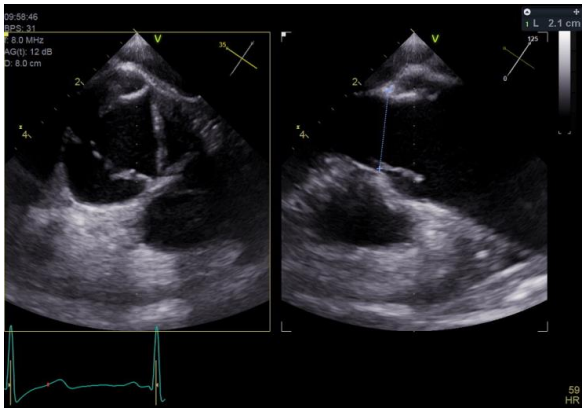
Example 1 TAV, central jet origin

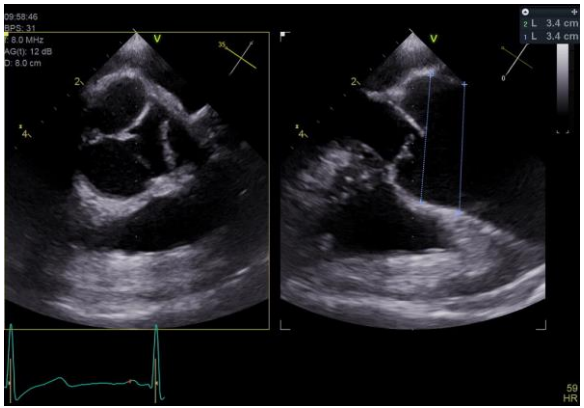




Example 1 TAV, central jet origin, eccentric jet,prolaps RCC





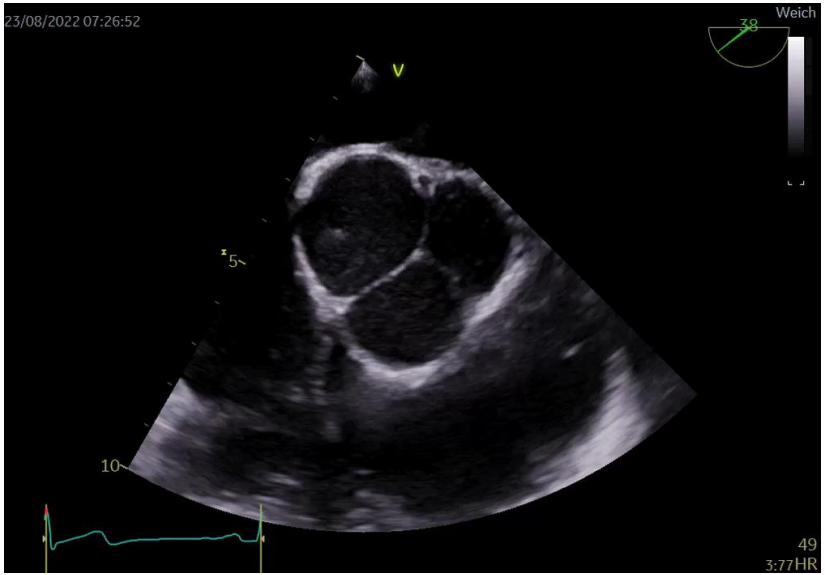


Example 1 synopsis and surgical treatment

- TAV, central jet origin
  eccentric jet, prolaps RCC
- Anulus 21, Sinus and ST 34 mm

- Annuloplastie 19mm Hegar
- Debridement LCC and NCC
- Resuspension of RCC
- Replacement of ascending Aorta

Example 2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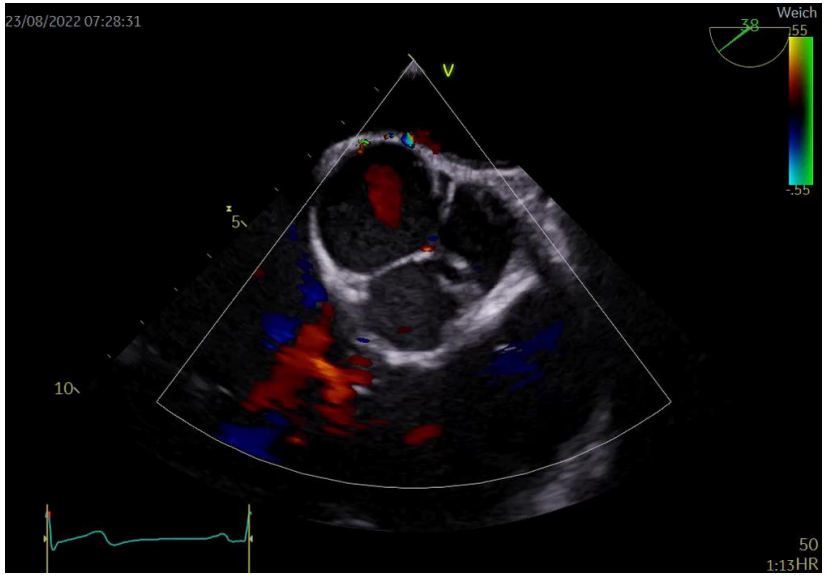
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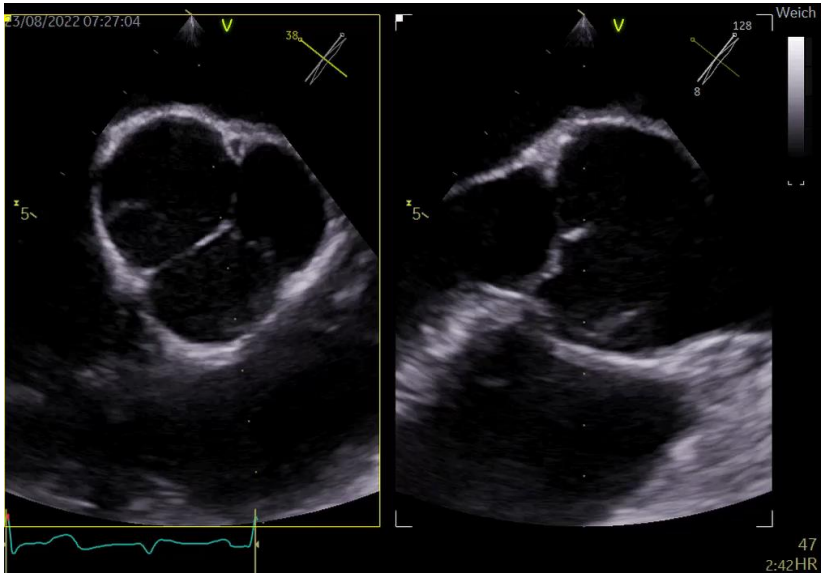
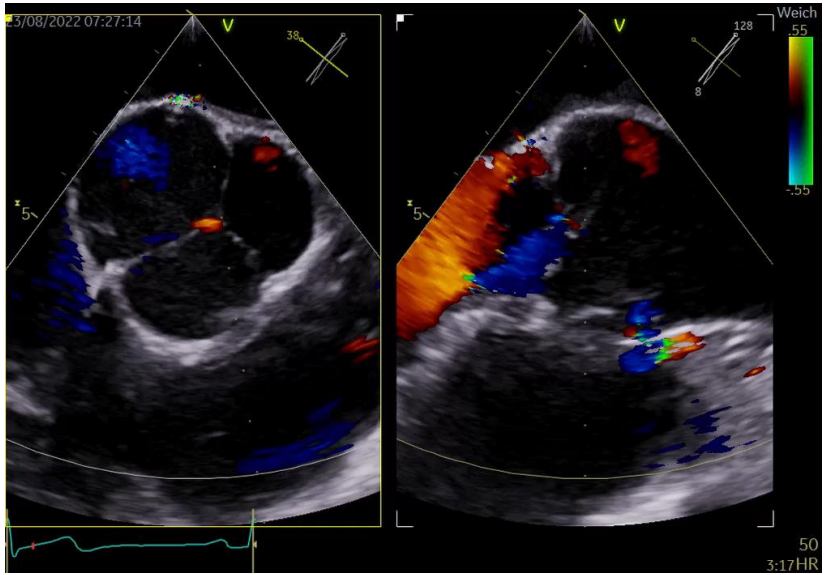
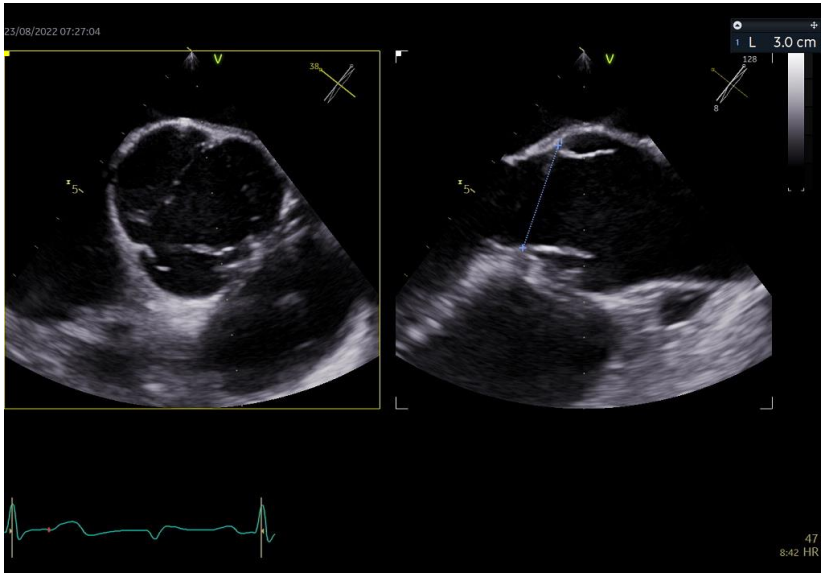
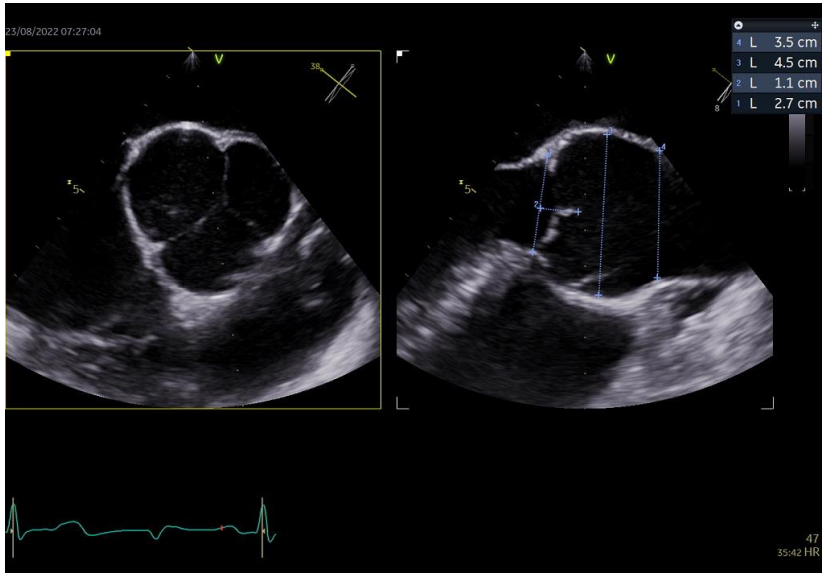
Example 2 TAV, probably insignificant AR





Example 2 TAV, insignificant AR





Example 2 synopsis and surgical treatment

- TAV, trace AR
- Annulus 30 mm, eH 11 mm
- Sinus 45 mm, ST 35 mm
- Remodelling of aortic root
- Annuloplastie 23mm Hegar
- Resuspension of RCC
- Fenestration of RCC => no touch

Postprocedural: what is acceptable?

- AR: none
  Eccentric jet => trace AR
  Central jet => V. contracta <3mm
- eH: >8mm

- cusp mobility: unrestricted
- Transvalvular gradient: < 10mmHg
- Billowing: <5 mm
- In BAV: commisural orientation >160°

Timing of postprocedural TEE

I: immediately after declamping

toughest test phase for AV: low LVEDP!

beware of LV distension with higher grades of AI!!

II: almost off pump (stable heart rhythm, normal arterial pressures,no air)

definite decision : acceptable or reclamp

III: during chest closure

repetition of the complete preprocedural exam

Summary

- Much is possible in TEE
- Usefull for intraoperative decision making
- Focus and timing are key

- Relevant echo information:
  - Valve type
  - jet direction and origin
  - Differentiation retraction prolapse
  - Aortic dimensions
  - Mechanism of AR

- Most information is obtainable by a focused protocol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