« Role of periprocedural transoesophageal echocardiography during interventional cardiology procedures »

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Transcatheter structural interventions

- PMC
- ASD/PFO closure
- TAVI
- TC MV repair

Mitral valve interventions

TV interventions…

LAA closure
From fluoroscopy to 2D/3D TEE

Fluoroscopy is the reference for interventional guidance but provides no information on soft tissue.
From fluoroscopy to 2D/3D TEE
From fluoroscopy to 2D/3D TEE

- 2D/3D TEE provides accurate visualization of cardiac structures, catheters and devices and their 3D inter relationship.
3DTEE during TC interventions

- Multiple 3D imaging modalities

3D zoom mode

Xplane mode
3DTEE during TC interventions

• Multiplane reconstruction (MPR)
Interventional echocardiography

- New echocardiographic specialty
- Experienced echocardiographer who is familiar with the anatomy and the imaging requirements
- Both echographer and interventionists can see fluoroscopy and echo +++
- Well-functioning team, common language and good communication +++
2D and 3D TEE during TC interventions

- 2D/3D TEE integral part of
  - Diagnostic and screening
  - Procedure planning
  - Procedural guidance and decision making
  - Detection of complications
  - Result assessment
Mitral valve interventions
- PMC
- Mitrataclip, Cardioband,…
- TMVI, Valve in Valve /in ring/in MAC

Periprosthetic leak closure

LAA closure

ASD/PFO closure

Tricuspid valve interventions….
Structural PC interventions

- Mitral valve interventions
  - PMC
  - **Mitraclip**, Cardioband,…
  - TMVI, Valve in Valve /in ring/in MAC
- Periprosthetic leak closure
- LAA closure
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- Tricuspid valve interventions….
Percutaneous Mitral Valve Repair
Mitraclip Edge-to-Edge Technique
**Mitraclip : anatomic eligibility**

“Everest criteria”

- Organic or functional MR
- Central (A2 P2) pathology
- Sufficient leaflet tissue for mechanical coaptation

- Protocol anatomic exclusions
  - Flail gap >10mm
  - Flail width >15mm
  - Coaptation depth >11mm
  - Coaptation length < 2mm

Feldman T, J Am Coll Cardiol  54:686-694, 2009
Mitraclip: procedural guidance
Mitraclip: procedural guidance

- Transseptal puncture: Xplane imaging

Rinaldi et al 2014
Mitraclip: procedural guidance

- Standardized 3D and X plane views
Mitraclip: procedural guidance

- Clip alignment  Perpendicularly
Mitraclip: procedural guidance

- Grasping of the leaflets
Mitraclip: procedural guidance

- Post grasp assessment

  - Leaflet attachment
  - Residual MR
  - MV gradient
Mitraclip: procedural guidance

- Role of TEE: decision making
  - Before release
    - Decision of clip release or repositioning
  - After release
    - Re assessment of MR, Gradient MV Area
    - Discussion of additional clip
    - Detection of complications
Mitraclip: procedural guidance

- Final result assessment

Residual MR  MV area  MV gradient
Detection of complications
Structural PC interventions

- Mitral valve interventions
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  - Mitraclip, Cardioband,…
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3D TEE during Cardioband procedure

MPR MultiPlanarReconstruction FlexiSlice

Courtesy of S von Bardeleben, RS Mainz
Structural PC interventions

- Mitral valve interventions
  - PMC
  - Mitraclip, Cardioband, …
  - TMVI, Valve in Valve /in ring/ in MAC
- Periprosthetic leak closure
- LAA closure
- ASD/PFO closure
- Tricuspid valve interventions…. 
TMVI using TAVI devices

Prosthetic dysfunction / Ring annulopasty failure

Degenerative MS (MAC)

Structural PC interventions

- Mitral valve interventions
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- Periprosthetic leak closure
- LAA closure
- ASD/PFO closure
- Tricuspid valve interventions….
Periprosthetic leak closure

- 3D TEE screening: localisation and extent of PV leaks
Periprosthetic leak closure

- 3D TEE screening: sizing
Structural PC interventions

- Mitral valve interventions
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  - Mitaclip, Cardioband,…
  - TMVI, Valve in Valve /in ring/ in MAC
- Periprosthetic leak closure
- LAA closure
- ASD/PFO closure
- Tricuspid valve interventions….
LAA closure

- 3D TEE screening: Exclusion of thrombus. Shape and size of LAA
TEE guidance during LAA closure
Structural PC interventions

- Mitral valve interventions
  - PMC
  - Mitraclip, Cardioband,…
  - TMVI, Valve in Valve /in ring/ in MAC
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Transcatheter tricuspid valve interventions
Tricuspid valve interventions
Edge to edge Tricuspid valve repair
Latest evolutions in TEE

- Image quality: new probes
- Optimal ergonomy: new tools
Live 3D color TEE

1 beat real time 3D acquisition with high volume rates in both gray scale and color
New live 3D Imaging tools

Live 3D cropping

Live 3D Multiplane view
New live 3D Imaging tools

• True view
• …
MicroTEE probe

x7-2t S7-3t S8-3t
MicroTEE (S8-3t)

- TS puncture
- PFO closure
- LAA closure
Limitations of TEE during TC interventions

• TEE generally performed under general anaesthesia and orotracheal intubation

• Semi invasive : Low but definite risk of gastroesophageal lesions during long procedures

• Importance of prevention : respect of contra indications, risk factors, avoid heating, kind manipulation...
2D and 3D TEE interventional echocardiography

- Specific imaging needs required in structural cardiac catheter based interventions
- Key role of real-time 2D and 3D TEE for selection, planning and guidance of TC interventions
- Procedure-specific views and terminology facilitate communication between the interventional echocardiographer and the interventionalist
  - Dramatic and continuous improvement in imaging
  - Next step: fusion of multiple imaging modalities…