Maastricht UMC+
Hart+Vaat Centrum

Endoscopic Mitral Valve Surgery

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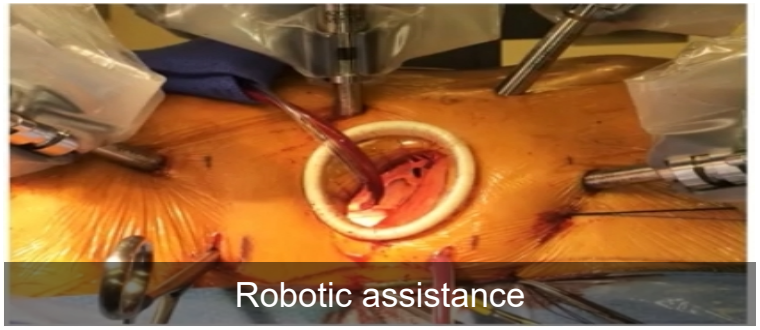
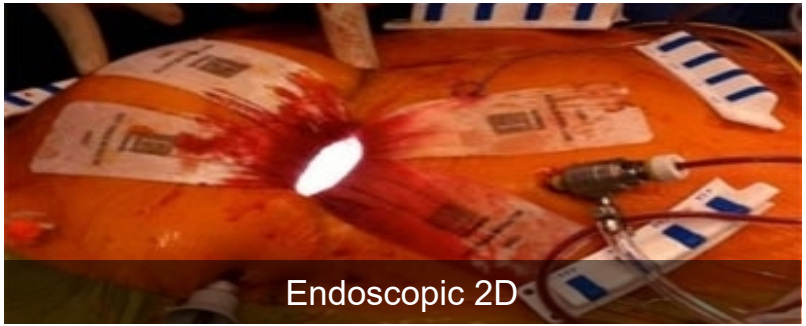
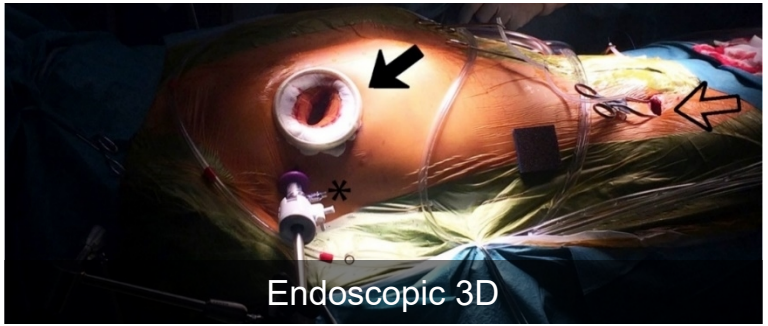
Disclosures

- Consultancy for Fujifilm corporation
- Consultancy for Neochord company
- Consultancy: Edwards Lifesciences
- Consultancy: Abbott
- Consultancy: Medtronic
- CEO/CMO Simurghy (start-up simulation)
- Chairman/CEO Heart Team academy

Minimally invasive mitral valve surgery







What is the evidence!

- Minimally invasive mitral valve surgery: a systematic review and meta-analysis. **Modi et al. EJCTS 2008**
- Minimally invasive versus conventional open mitral valve surgery: a meta-analysis and systematic review. **Cheng et al. Innovations 2011**
- A meta-analysis of minimally invasive versus conventional mitral valve repair for patients with degenerative mitral disease. Cao et al. **Ann Cardiothorac Surg 2013**
- Systematic review of robotic minimally invasive mitral valve surgery. Seco et al. **Ann Cardiothorac Surg 2013**
- Anterolateral minithoracotomy versus median sternotomy for mitral valve disease: a meta-analysis. Ding et al. **J Zhejiang Univ Sci B. 2014.**
- What Is the Role of Minimally Invasive Mitral Valve Surgery in High-Risk Patients? A Meta-Analysis of Observational Studies. Moscarelli et al**. Ann thorac Surg 2016**
- **Many single center/surgeon studies**

Short- and long-term outcomes of patients undergoing MIMVS versus median sternotomy (MST) based on real-world data, extracted from the Netherlands Heart Registration in over 2500 pa

Key question

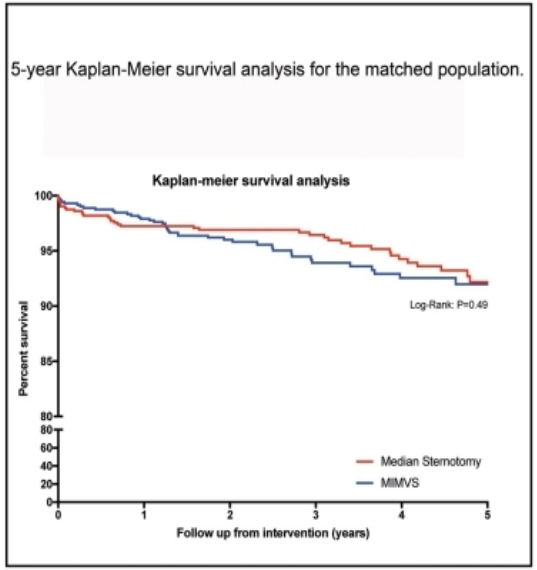
Are short- and long-term outcomes of patients undergoing MIMVS versus sternotomy comparable, based on real-world data?

Key finding(s)

There are no differences in 5-year survival. MIMVS results in a lower repair rate and more reinterventions after 5 years.

Take-home message

MIMVS is as safe as sternotomy. In the real-world, MIMVS comes at a cost of a reduced repair rate and more reinterventions in the long term.



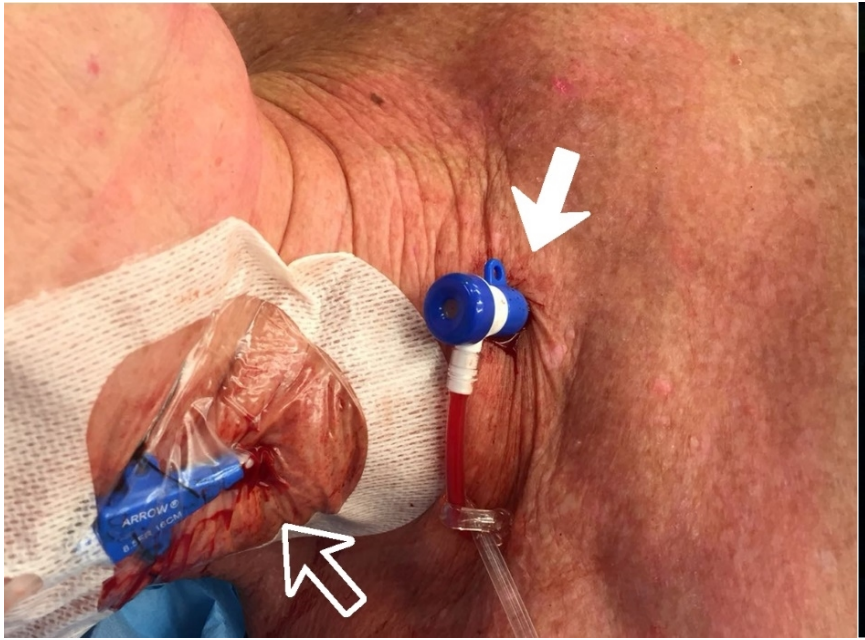
30-day mortality around 1%
Repair rate 80%
Freedom from mitra re-intervention at 5 years 97
Stroke around 1%
5-year Survival 95%

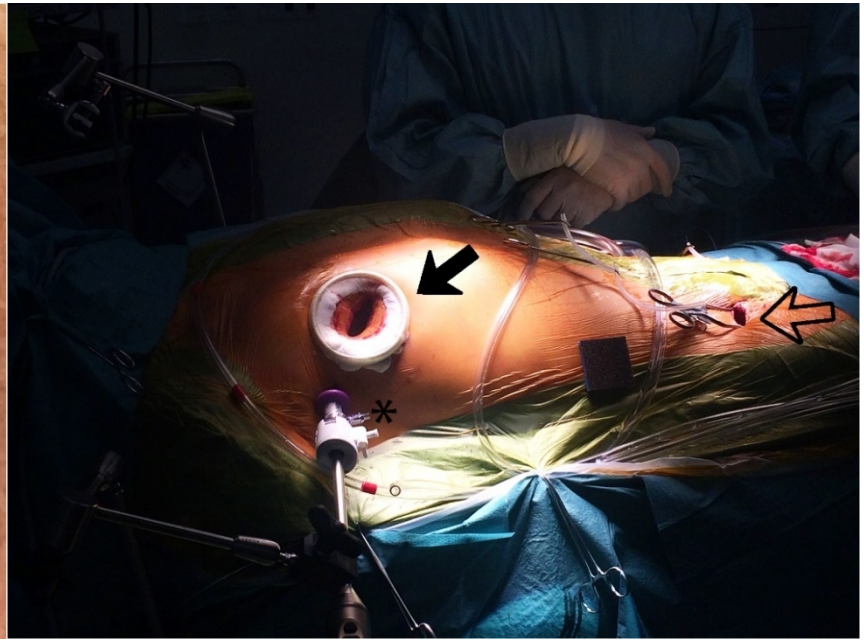
Excellent results of surgery

Olsthoorn JR, Heuts S, Houterman S, Maessen JG, Sardari Nia P. Effect of minimally invasive mitral valve surgery compared to ster on short- and long-term outcomes: a retrospective multicentre interventional cohort study based on Netherlands Heart Registration. Eur J Cardiothorac Surg. 2021 Dec 8:ezab507.

Patient positioning

Sheath for percutaneous venous cannulation





Three approaches depending on patient

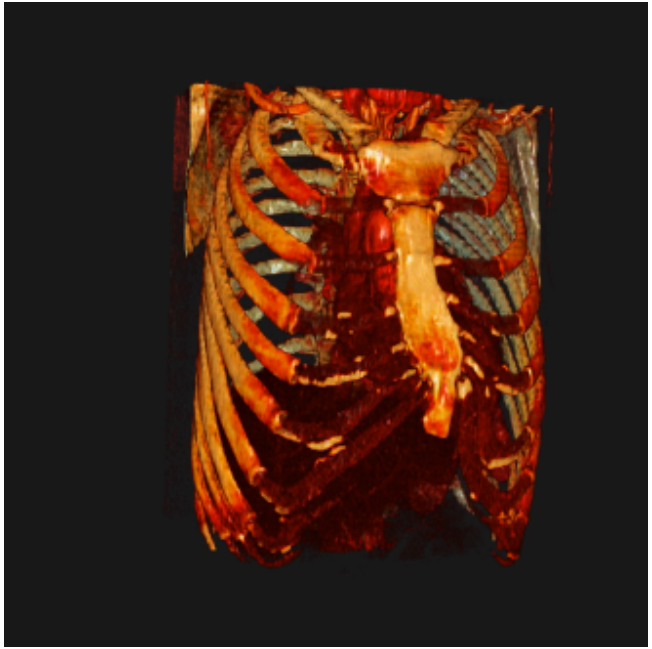
- External (Chitwood) clamp
- Intra-aortic balloon (after you mastered the techniques)
- Fibrillating heart (after you mastered the above)

Standard work-up

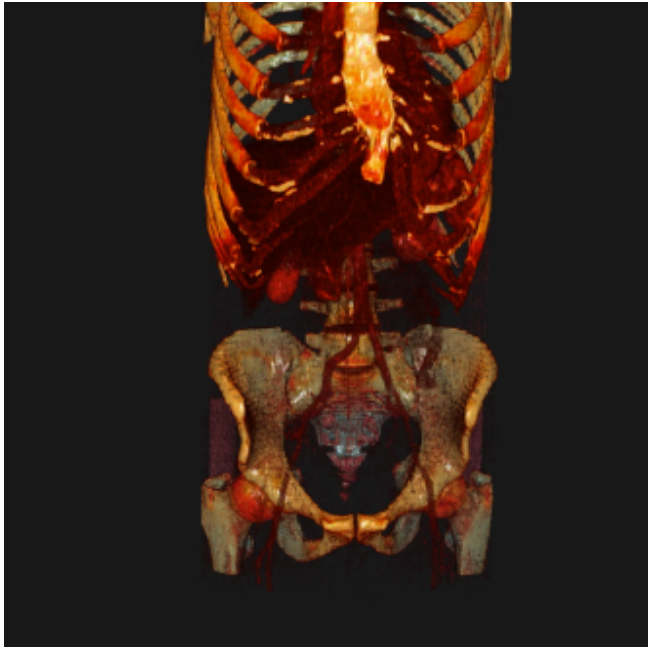
- RV-function, PHT and right cath with reversibility test
- Chest X-ray
- TTE and TEE: severity and mechanisms
- CAG: coronary anatomy: left dominant?
- CT-scan
- 3D reconstruction
- 3D printing
- Simulation

3D reconstruction

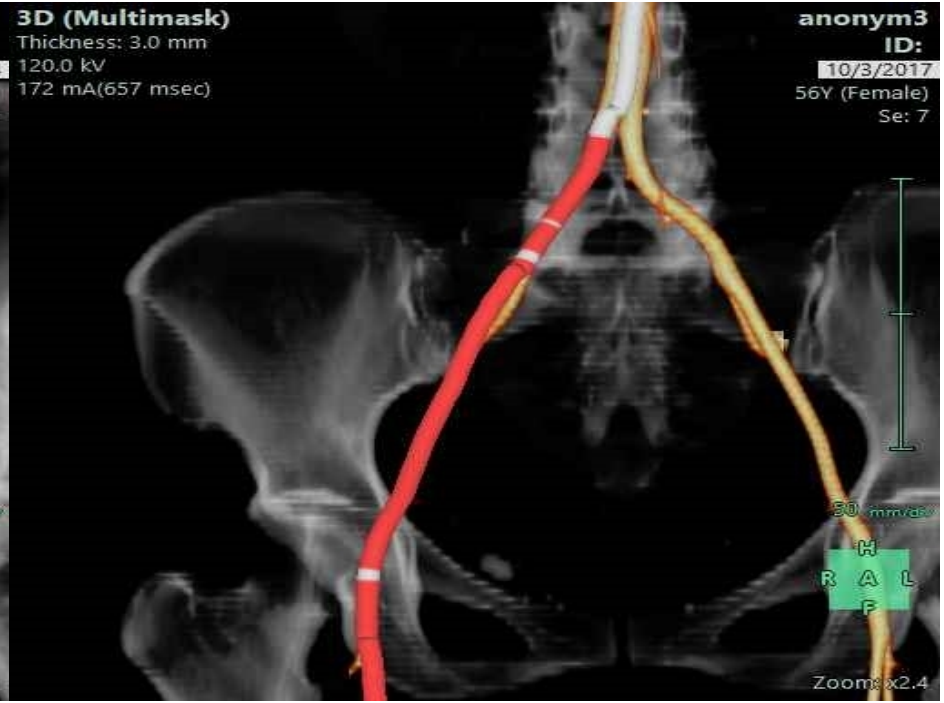
CT reconstruction – level of incision



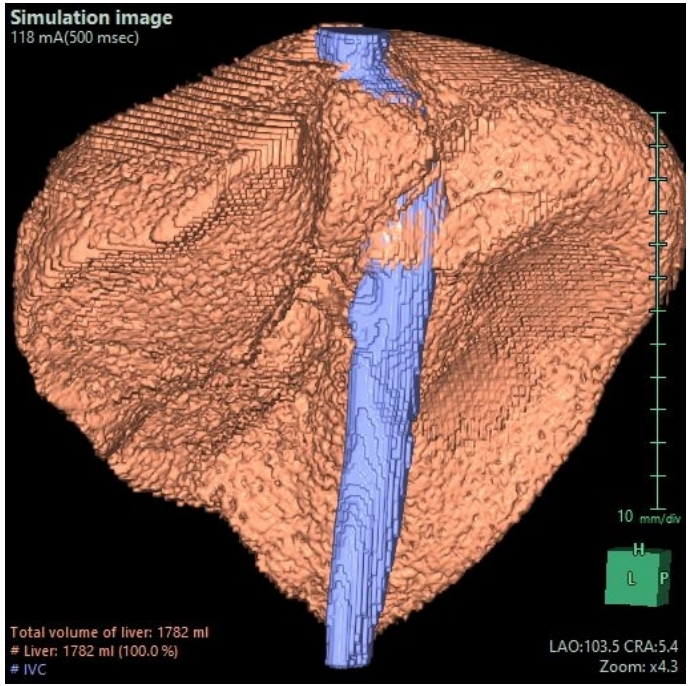
CT reconstruction – CPB cannulation



You could simulate cannulation before going to the OR!
You could determine the feasibility to advance your Endo-Balloon!

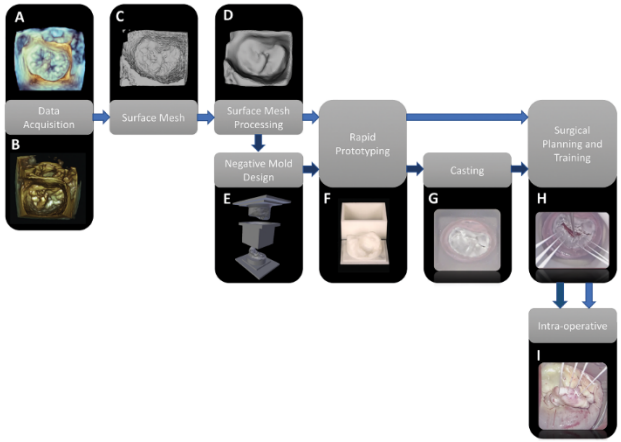


CT reconstruction – CPB cannulation



- 25Ch venous cannula
- Normal trajectory IVC

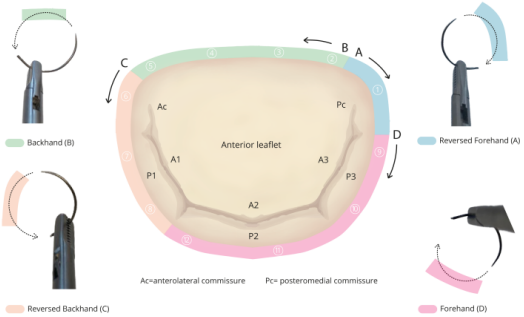
Sardari Nia P et al. ICVTS 2017
Sardari Nia P. et al. EJCTS 2018
Sardari Nia P et al. JTCVS 2019



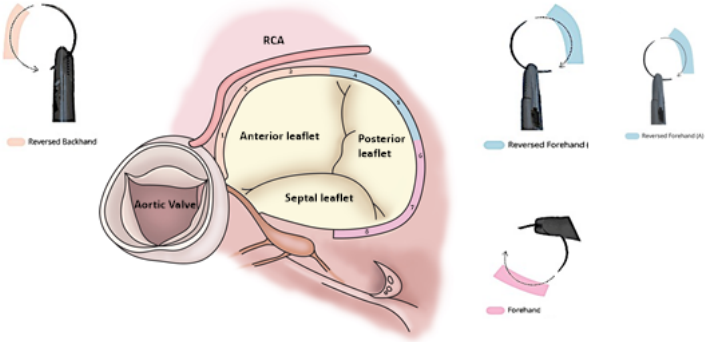
Patient-specific pathologic valve in the simulator for planning and education

Suturing Maps for endoscopic valvular surg

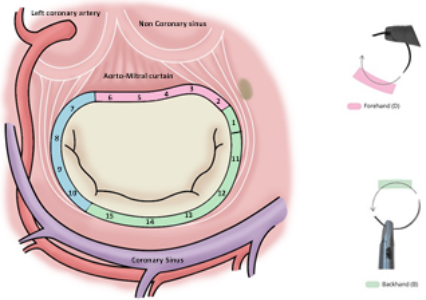
Suturing Map MVr



Suturing Map TVr

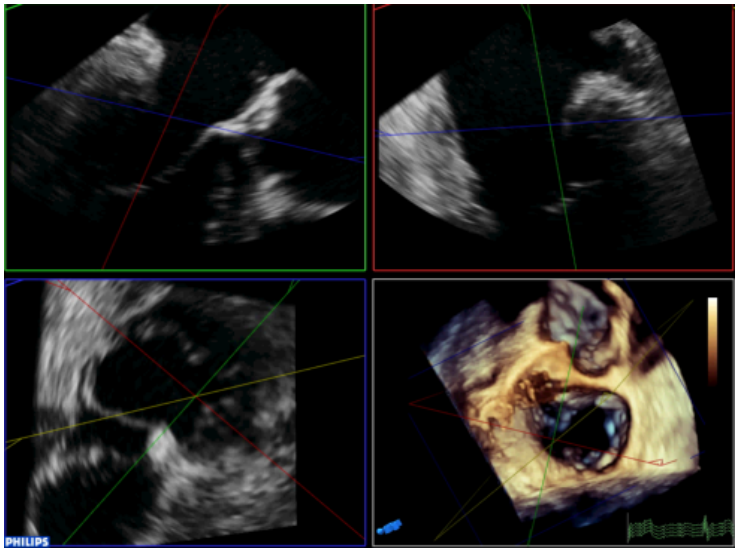


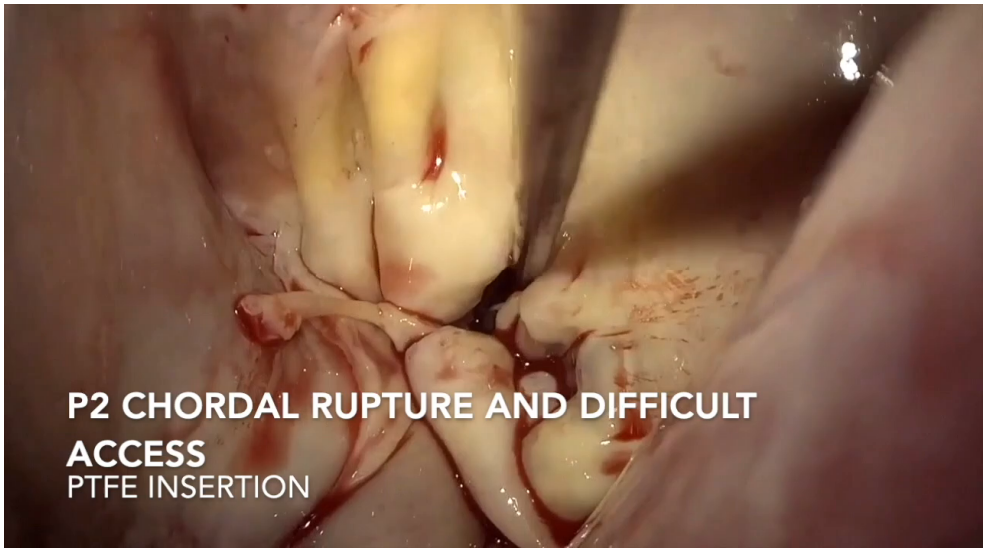
Suturing Map MVR



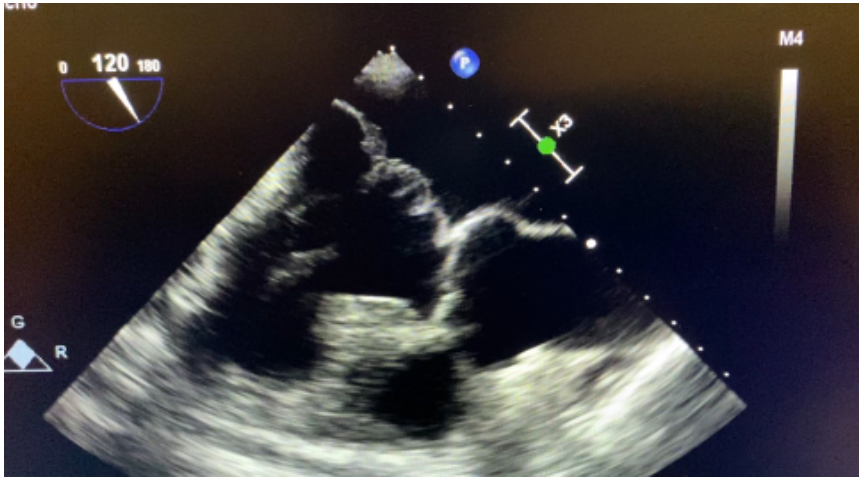
Sardari Nia et al. MMCTS

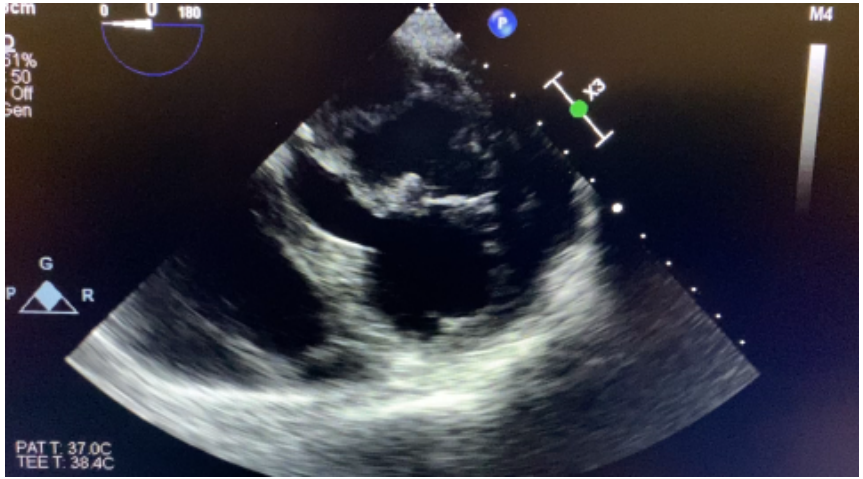
P2 Chordal rupture (Difficult access)





Complex Barlow



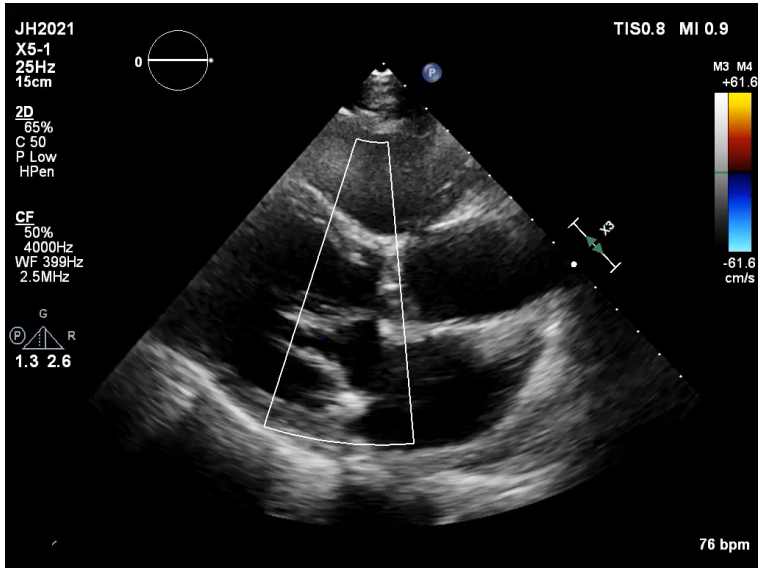


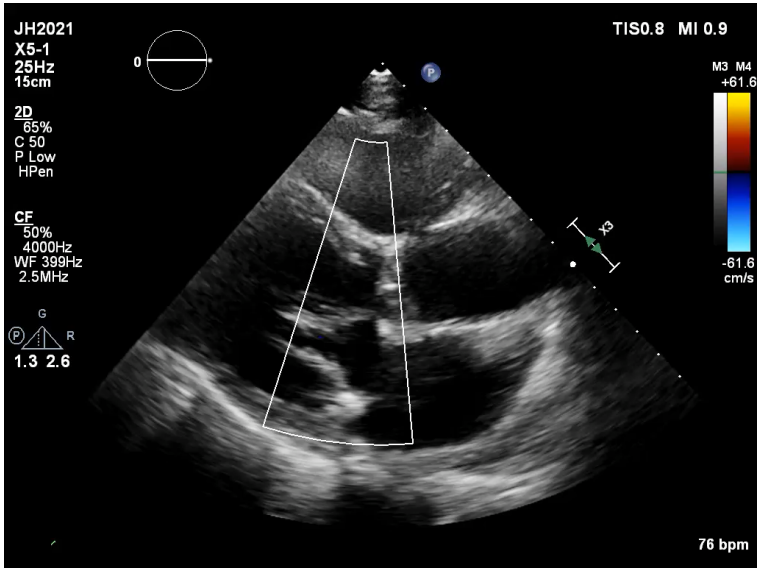
Operation

mini-MVr en linker Maze
-Quadrangulair resection P2-P1
-Slidingplasty van rest van P2
-Reposition intermediate head PM
-2 neochordae P1
-2 neochordae neo-P2
-2 neochordae P3
-4 neochordae A2
-Closure cleft P1-P2
-Closure cleft P2-P3
-ring 40mm

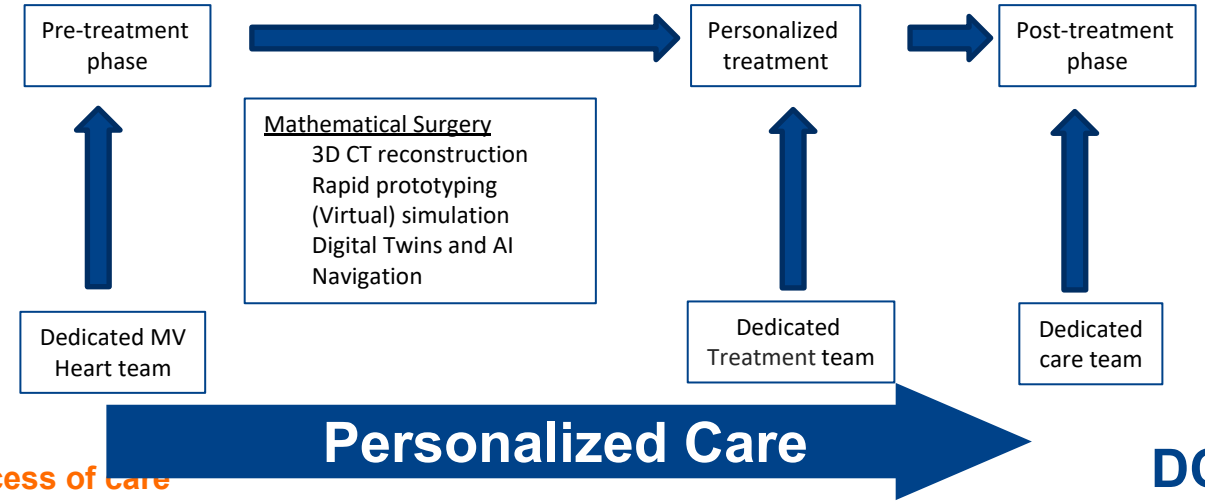
Left Maze met cryo-ablation
-PVIs
-Boxlesions
-linker ischmusline
-sinus coronariusline
-clip LAA

Last follow-up at 36 months





Dedicated Heart Team focussed on singular pathology. Formula of success?
Same team for the whole trajectory of patientcare



Pillars:
- Focus on whole process of care
- Dedicated heart-teams
- Pre-operative planning

DCC-trial
SMILE Registry

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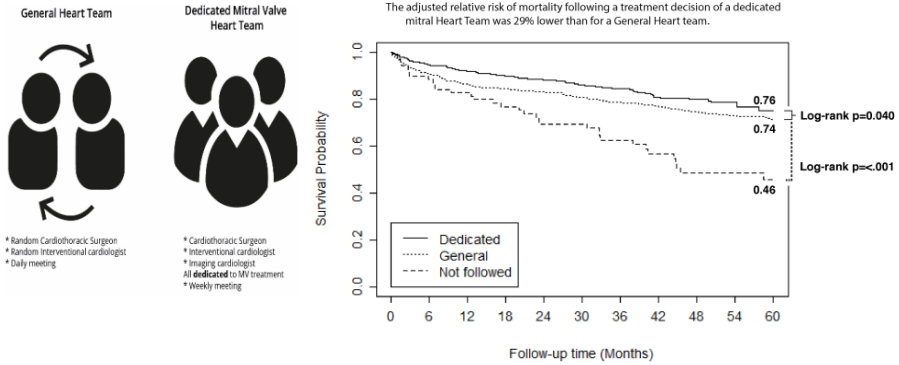
Peyman Sardari Nia et al. ICVTS 2017.

Dedicated multidisciplinary Mitral Heart Team improves survival in patients with mitral valve disease: retrospective cohort of 1145 patients



Patients following advice of dedicated Heart-Team have 61% lower adjusted RR of mortality: HR 0.39 (CI 0.25-0.62, P <0.001)

Sardari Nia et al. EJCTS 2021

	General Heart Team (n=504)	Dedicated Heart Team (n=641)	p-value
30-day mortality			
Overall	26 (5.2%)	19 (3.0%)	0.058
Surgical	21 (7.4%)	11 (3.8%)	0.063
Isolated* MV surgery	8 (4.8%)	4 (1.8%)	0.14
Elective isolated* MV surgery	7 (4.4%)	3 (1.4%)	0.10
Trans-catheter Mitral non-intervention	0	3 (3.0%)	1.00
	5 (2.4%)	5 (2.0%)	1.00
1-year mortality			
Overall	74 (14.7%)	57 (8.9%)	0.002
Surgical	41 (14.4%)	20 (6.9%)	0.004
Isolated* MV surgery	15 (9.1%)	9 (4.1%)	0.046
Elective isolated* MV surgery	13 (8.2%)	8 (3.7%)	0.064
Trans-catheter Mitral non-intervention	2 (28.6%)	11 (10.9%)	0.20
	31 (14.6%)	26 (10.4%)	0.16

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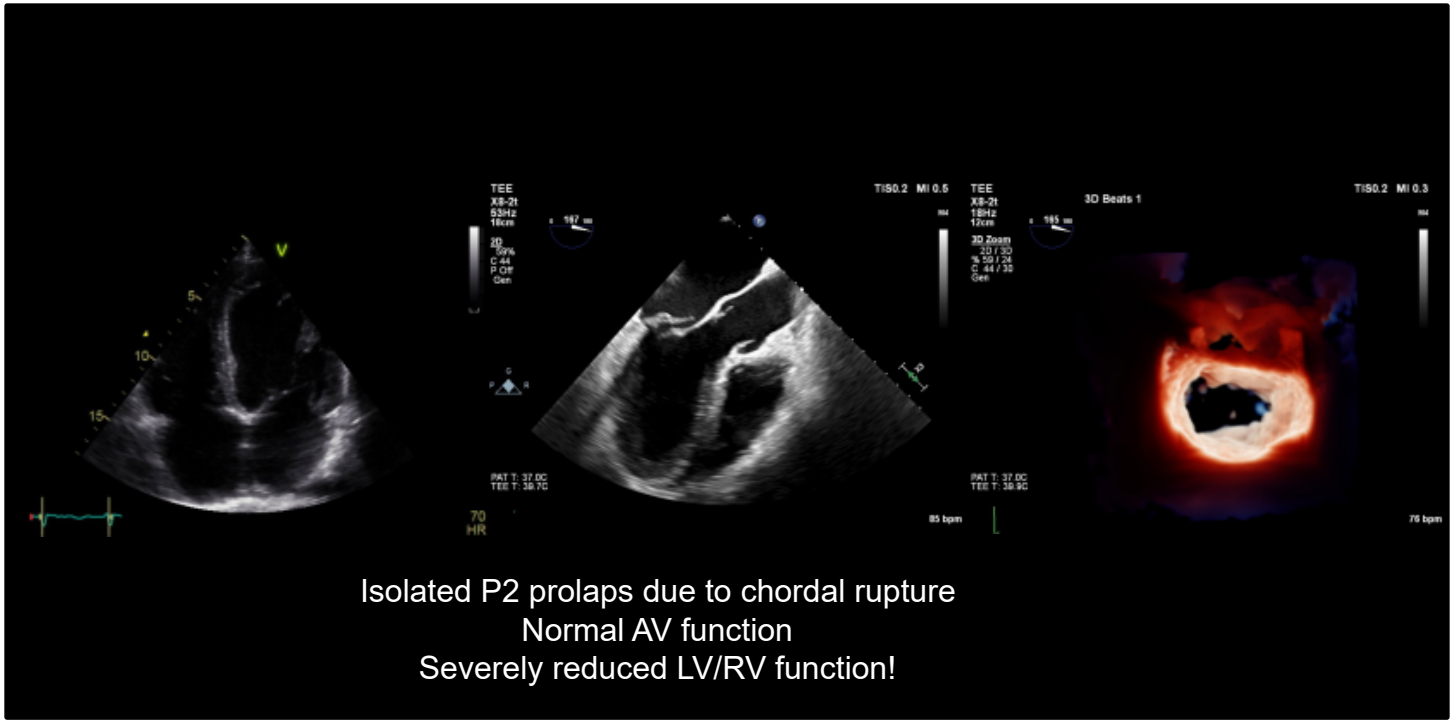

Isolated P2 prolaps due to chordal rupture
Normal AV function
Severely reduced LV/RV function!

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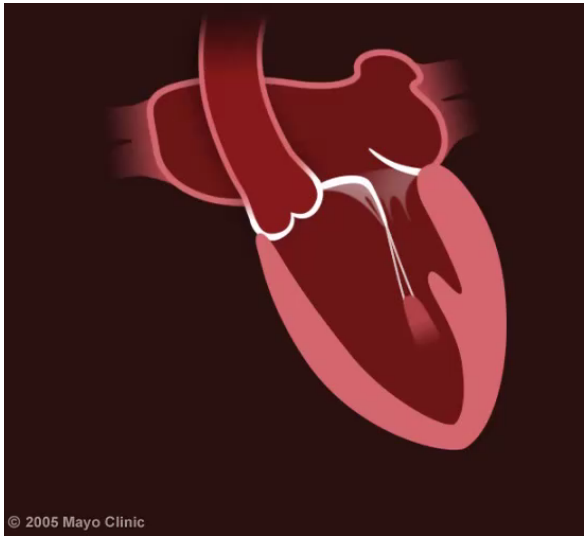
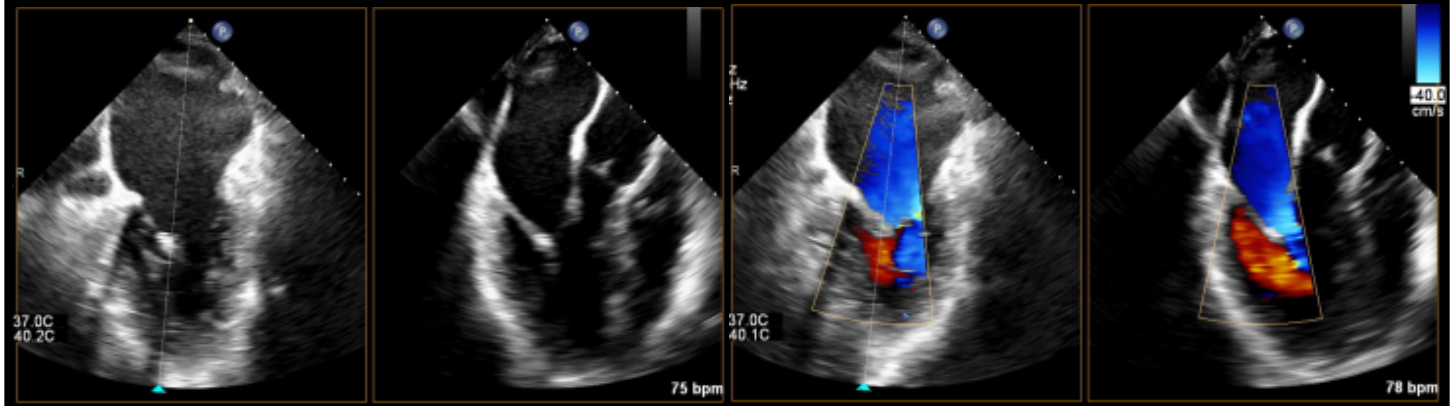
NeoChord Mitral Valve Repair

Trans ventricular
Off-pump
Echo guided



Final peroperative result



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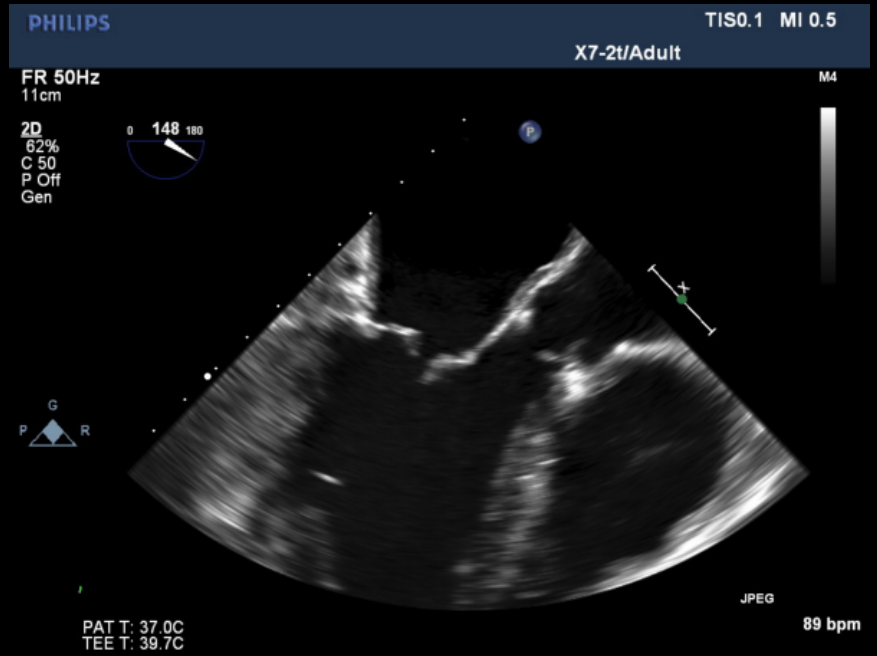
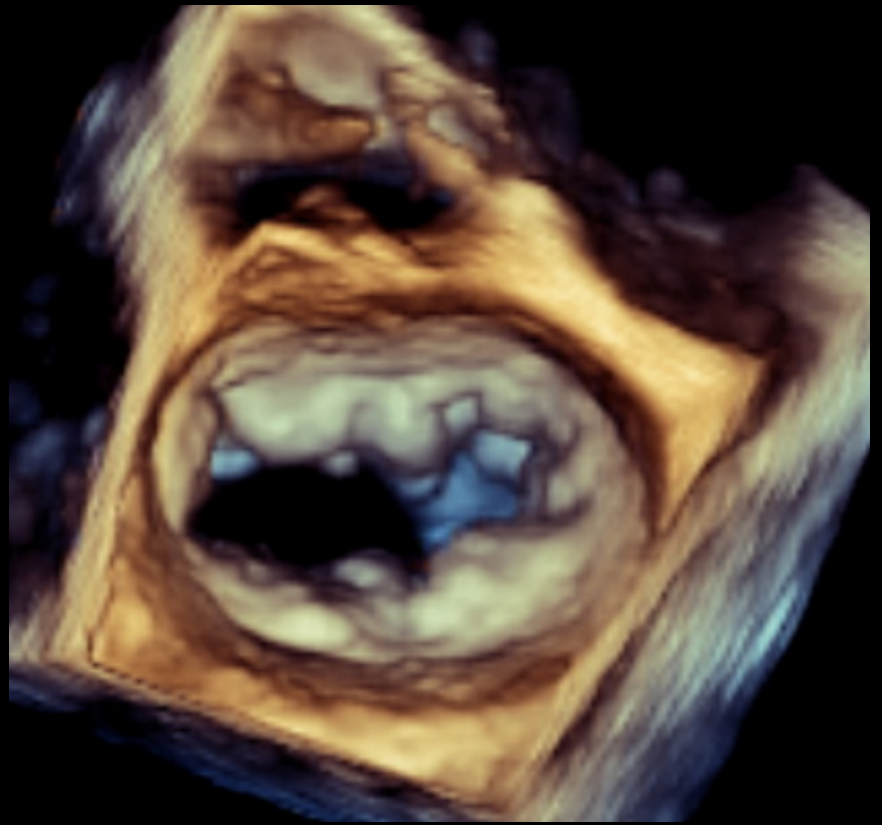
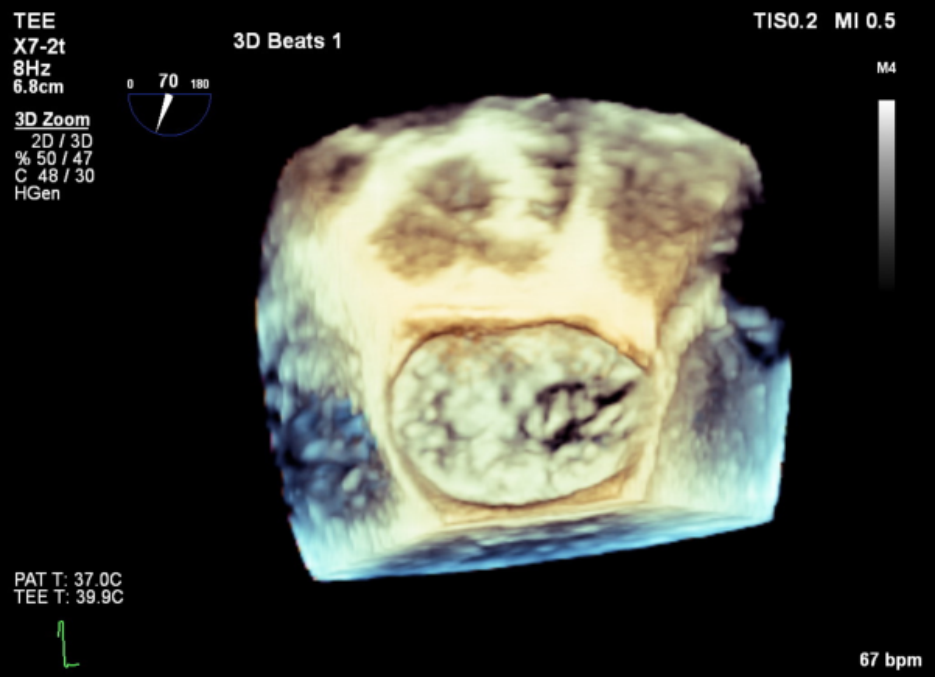
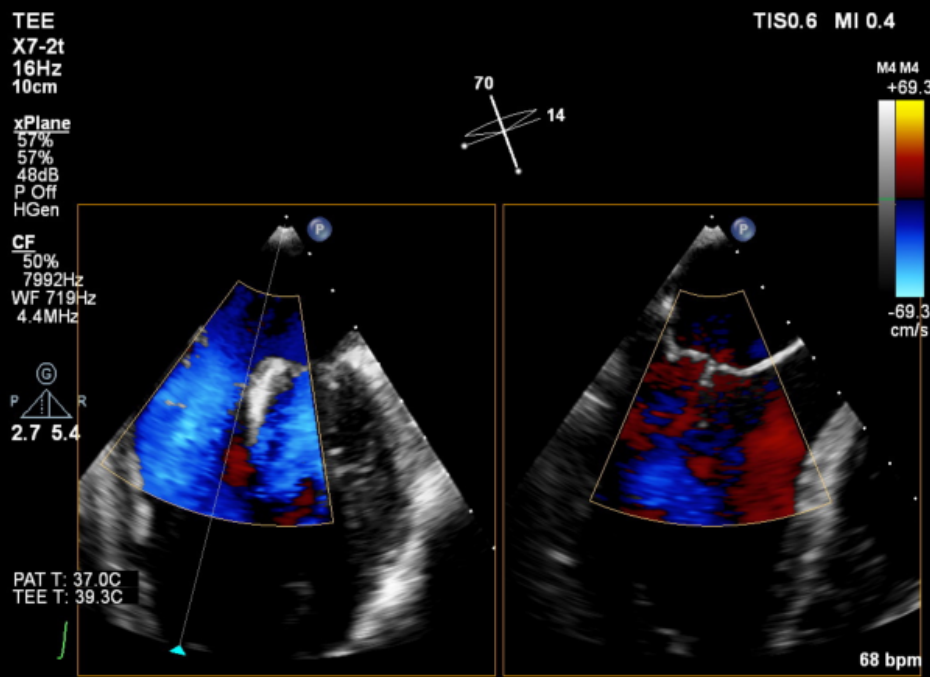
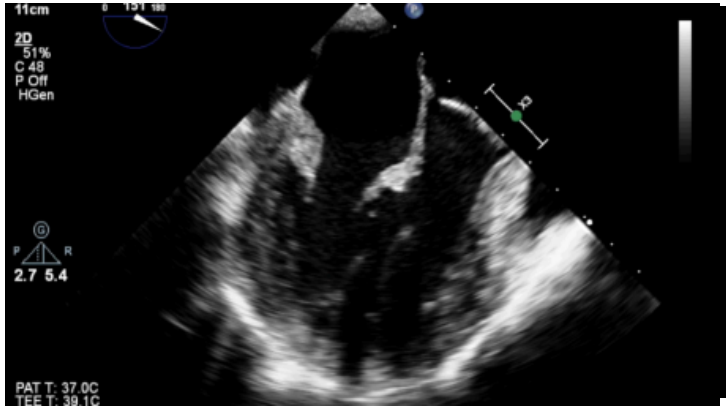

PHILIPS
TIS0.1 MI 0.5
X7-2t/Adult
FR 50Hz
11cm
M4
2D
62%
C 50
P Off
Gen
0 148 180
G
P R
JPEG
89 bpm
PAT T: 37.0C
TEE T: 39.7C

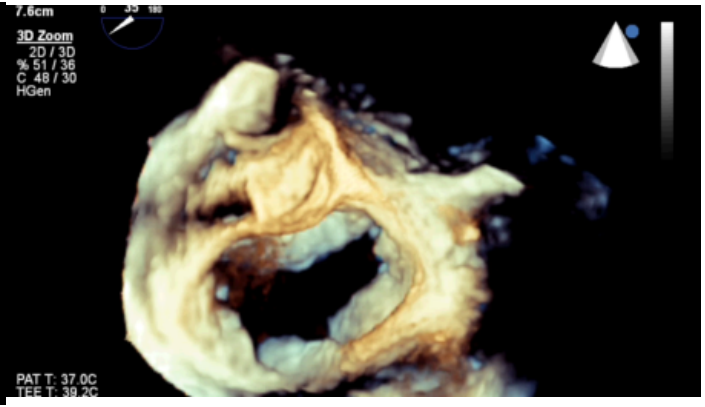


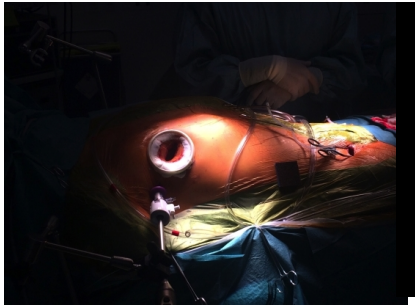
P2 prolaps

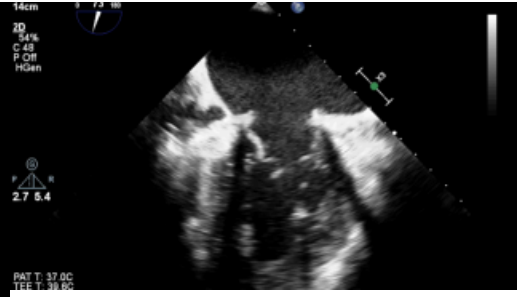

TEE
X7-2t
8Hz
6.8cm
3D Zoom
2D / 3D
% 50 / 47
C 48 / 30
HGen
3D Beats 1
TIS0.2 MI 0.5
M4
PAT T: 37.0C
TEE T: 39.9C
67 bpm


TEE
X7-2t
16Hz
10cm
xPlane
57%
57%
48dB
P Off
HGen
CF
50%
7992Hz
WF 719Hz
4.4MHz
2.7 5.4
TIS0.6 MI 0.4
M4 M4
+69.3
-69.3
cm/s
PAT T: 37.0C
TEE T: 39.3C
68 bpm


11cm
2D
51%
C 48
P Off
HGen
2.7 5.4
PAT T: 37.0C
TEE T: 39.1C


7.6cm
3D Zoom
2D / 3D
% 51 / 36
C 48 / 30
HGen
PAT T: 37.0C
TEE T: 39.2C




14cm
2D
54%
C 48
P Off
HGen
2.7 5.4

Endoscopic approach is a tool in the toolbox and future is the Smart surgery formula!

Dedicated team
Pathology-based

Tailoring based on individual anatomy

Simulation for predictability

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