CARDIOLOGY 2023

Characterizing Form and Function of the Circulation for Decision Making

Advanced ECHO Techniques: Utility in Critical Decision Making

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No financial disclosures

- Impostor talk...

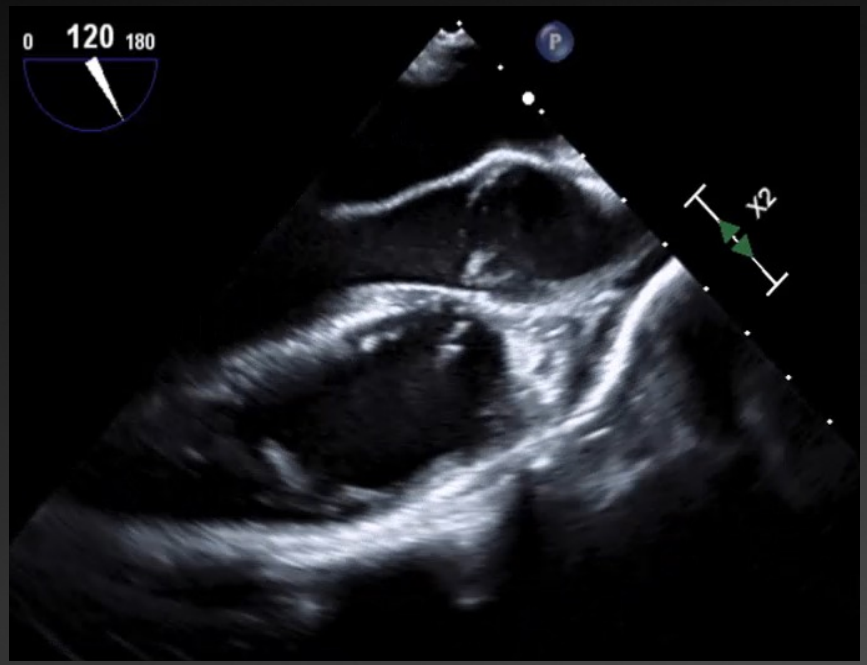
How do we define advanced techniques?

- A. Anything that is not 2D, M-mode or Doppler
- B. Anything that looks nice, is still under research, no one else can reproduce but you, requires an extra set of hands, and hasn't been published yet
- C. B except that the technique has been published

Outline

- 3D echocardiography to inform surgical planning
- Contrast echocardiography
- Myocardial deformation/ strain: function and dyssynchrony studies
- Other (being creative)

We don’t know what we are seeing in 2D!



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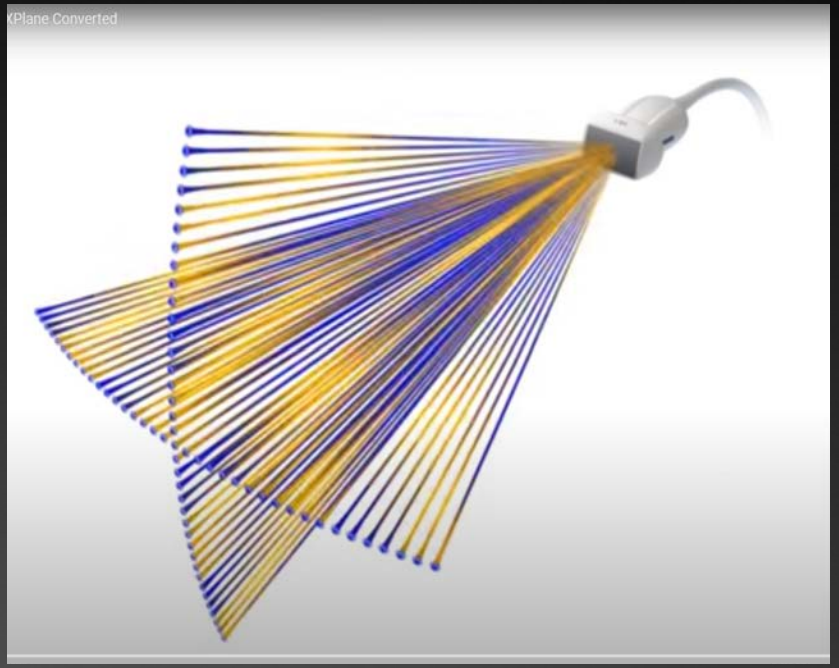
Courtesy Dr. Michael Quartermain

Don’t forget about xPlane!

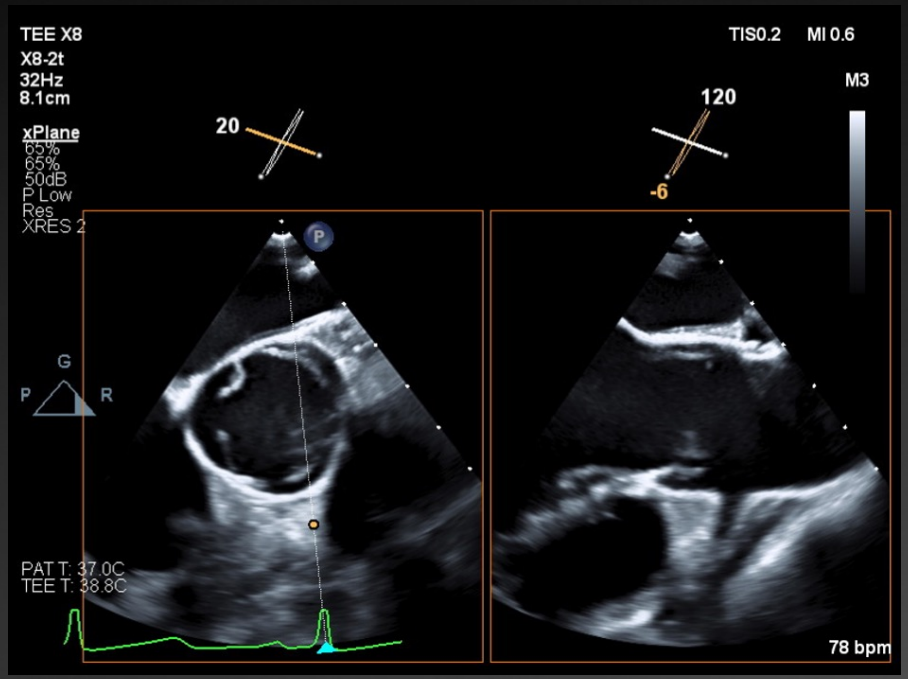
- Very helpful for sorting out anatomy
- Gives two full resolution planes simultaneously
  - Reference plane and a lateral plane that can be rotated
  - Very helpful in defining complex valve mechanisms and pathologies



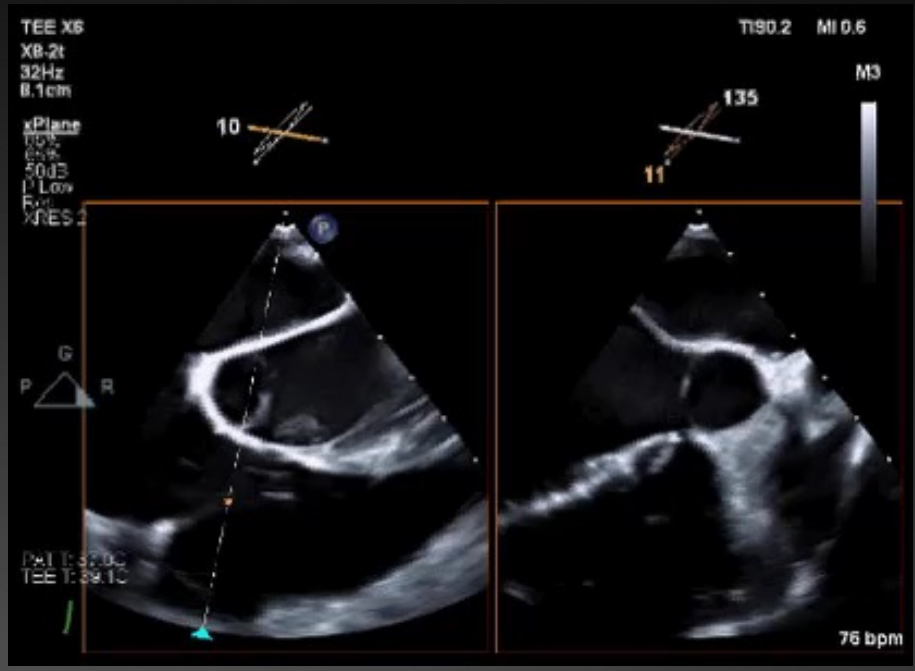
Courtesy Dr. Michael Quartermain

xPlane

L-R cusps



Non-c- cusp



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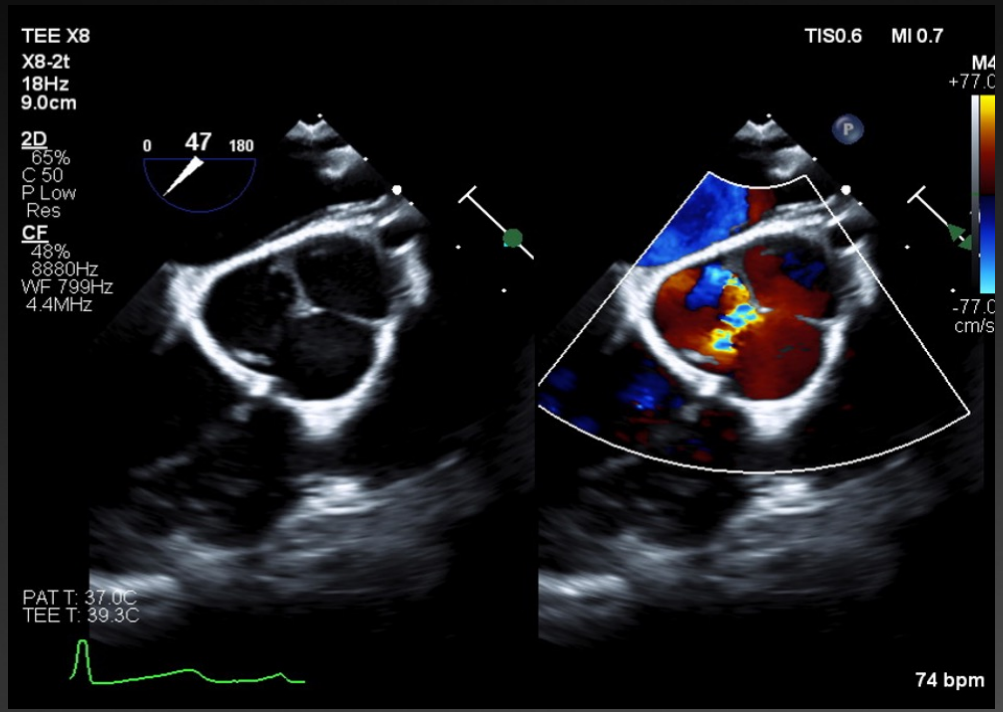
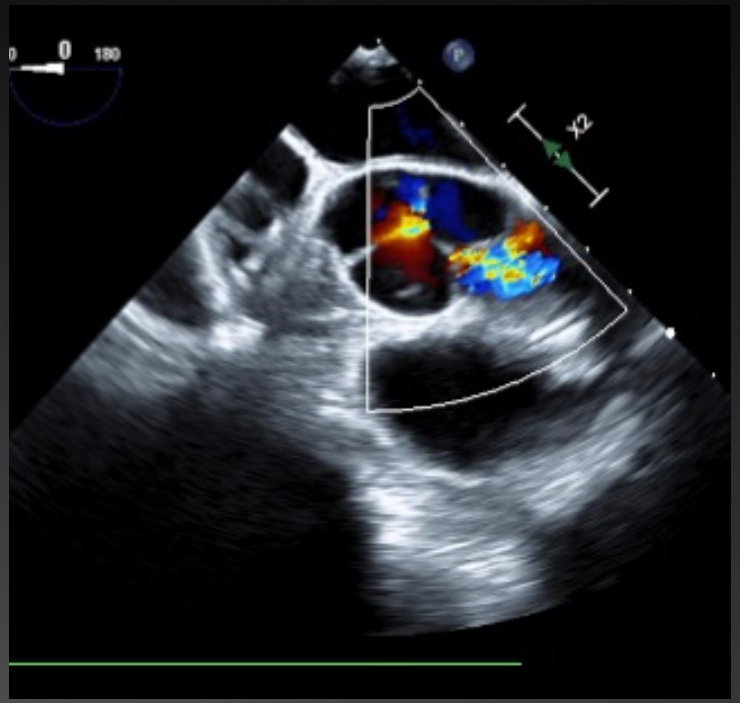
Non-coronary cusp is the problem





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3D of the valve

Single Leaflet Ozaki

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Courtesy Dr. Michael Quartermain

Editorial > Semin Thorac Cardiovasc Surg. 2022 Winter;34(4):1273-1274.
doi: 10.1053/j.semtcvs.2021.11.001. Epub 2021 Nov 8.

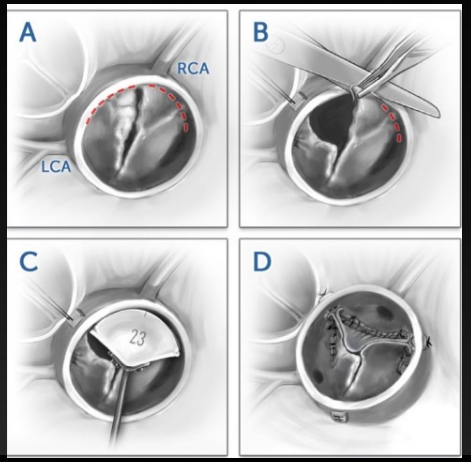
Commentary: What is the Sound of One Hand Clapping?

Jonathan M Chen [1]

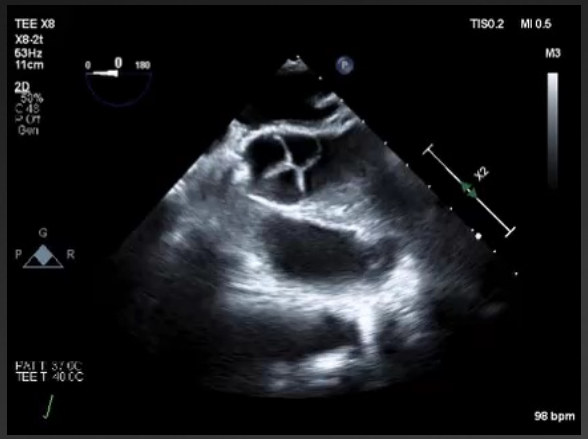
> Semin Thorac Cardiovasc Surg. 2022 Winter;34(4):1262-1272. doi: 10.1053/j.semtcvs.2021.10.009. Epub 2021 Oct 29.

Single-Leaflet Aortic Valve Reconstruction Utilizing the Ozaki Technique in Patients With Congenital Aortic Valve Disease

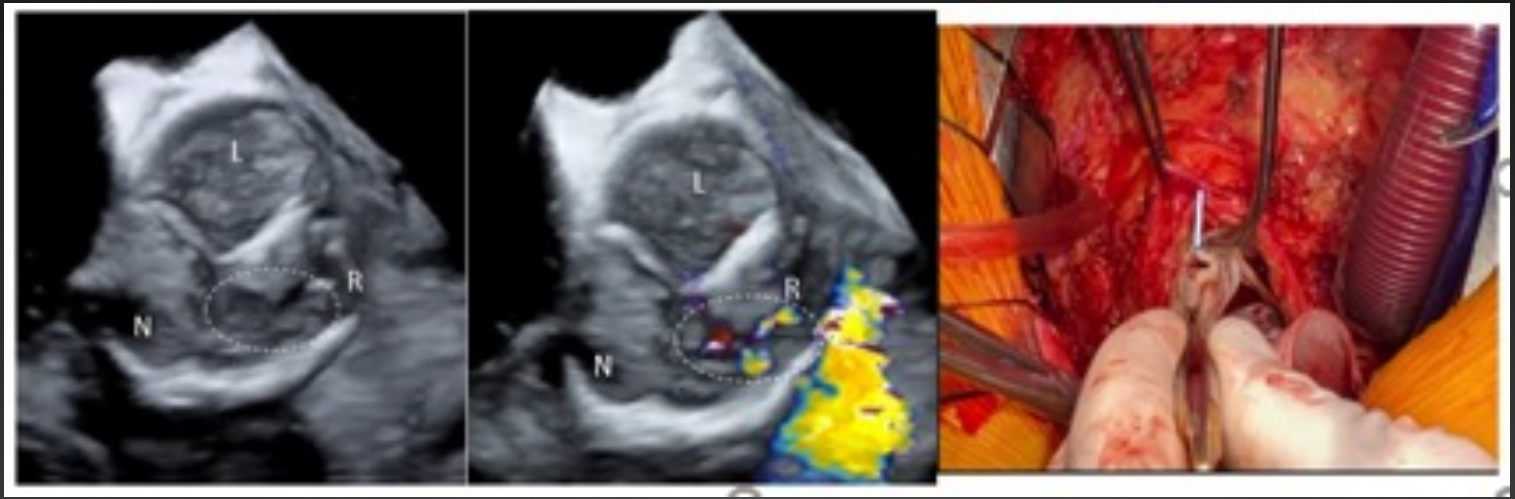
Supreet P Marathe [1], Mariana Chávez [1], Lynn A Sleeper [2], Gerald R Marx [2], Kevin Friedman [2], Eric N Feins [1], Pedro J Del Nido [1], Christopher W Baird [3]



After single- leaflet Ozaki

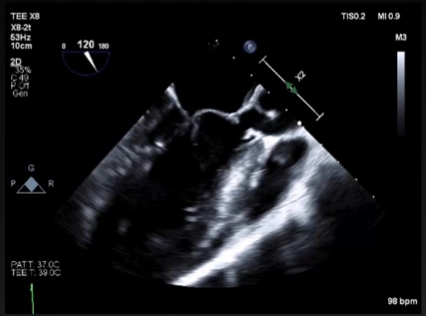


Patient with TOF and progressive aortic insufficiency: perforation of the right coronary cusp



Courtesy Dr. Michael Quartermain

12-year-old trisomy 21, s/p atrioventricular canal repair with left ventricular outflow tract obstruction and left atrioventricular valve regurgitation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2D
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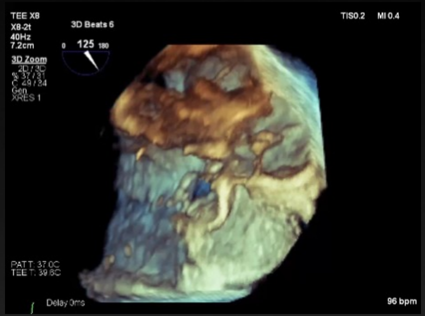
MI 0.9
120
M3
PAT T: 37.0C
TEE T: 39.0C
98 bpm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X8-2t
40Hz
7.2cm
3D Zoom
3D Beats 6
125
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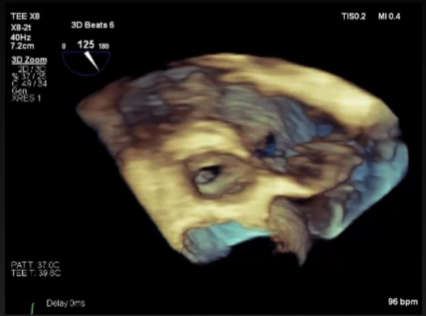
MI 0.4
PAT T: 37.0C
TEE T: 39.8C
Delay 0ms
96 bpm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X8-2t
40Hz
7.2cm
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3D Beats 6
125
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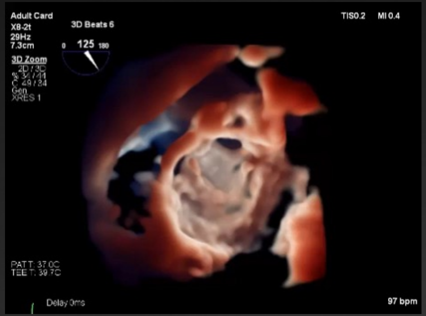
MI 0.4
PAT T: 37.0C
TEE T: 39.8C
Delay 0ms
96 bpm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7.3cm
3D Zoom
3D Beats 6
125
TIS0.2
MI 0.4
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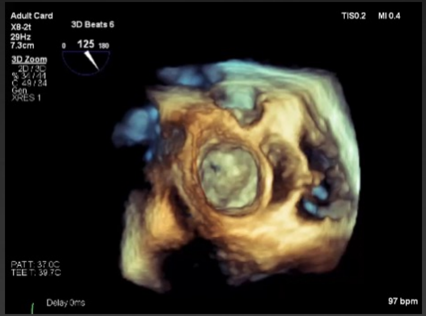
TEE T: 39.7C
Delay 0ms
97 bpm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7.3cm
3D Zoom
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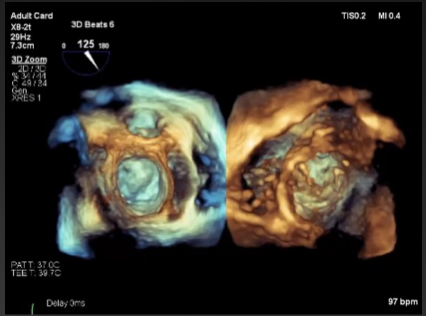
125
TIS0.2
MI 0.4
PAT T: 37.0C
TEE T: 39.7C
Delay 0ms
97 bpm


Adult Card
X8-2t
29Hz
7.3cm
3D Zoom
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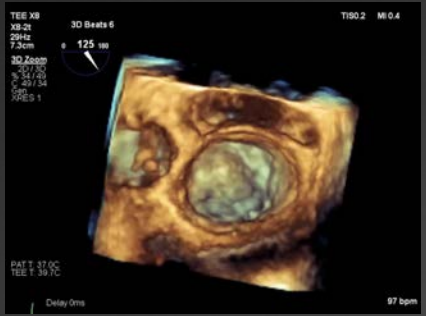
125
TIS0.2
MI 0.4
PAT T: 37.0C
TEE T: 39.7C
Delay 0ms
97 bpm


TEE X8
X8-2t
29Hz
7.3cm
3D Zoom
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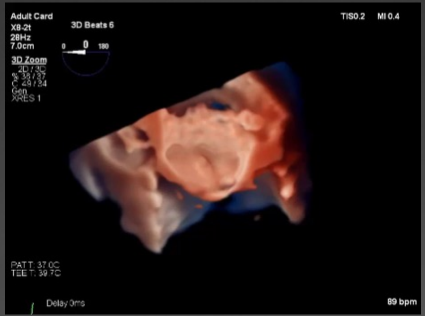
TEE T: 39.7C
Delay 0ms
97 bpm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28Hz
7.0cm
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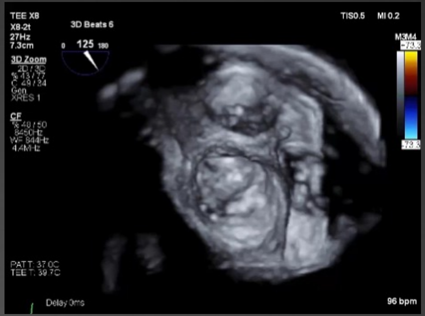
PAT T: 37.0C
TEE T: 39.7C
Delay 0ms
89 bpm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X8-2t
27Hz
7.3cm
3D Zoom
CF
3D Beats 6
125
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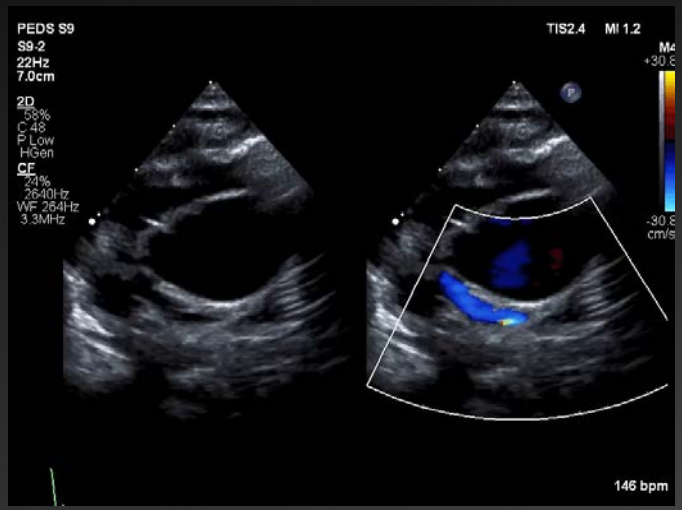
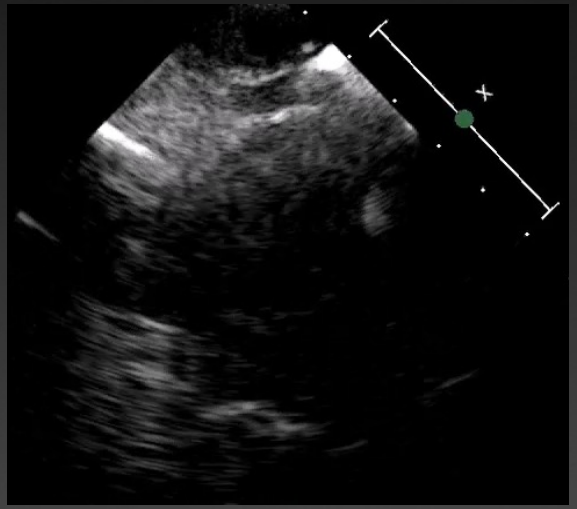
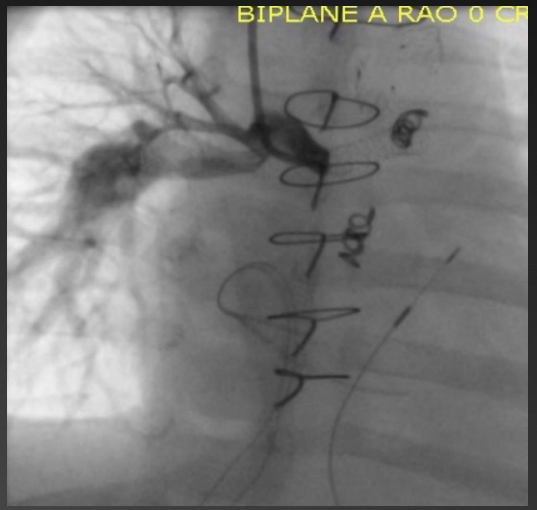
TEE T: 39.7C
Delay 0ms
96 bpm

Use of contrast echocardiography in critical decision making

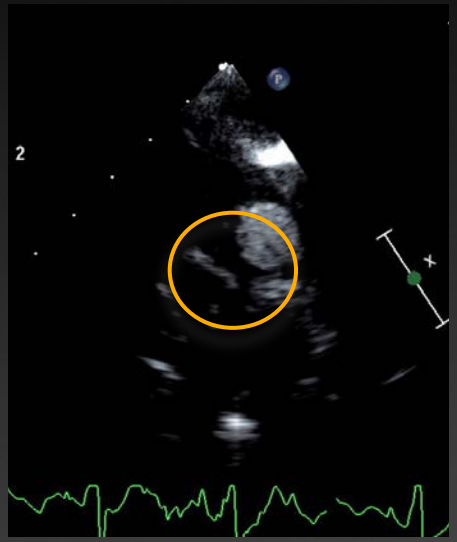


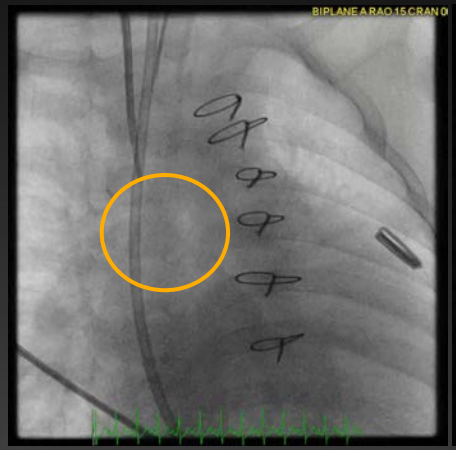


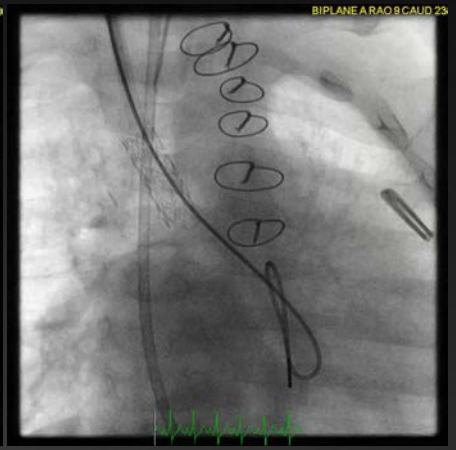


Courtesy Dr. Michael Quartermain

Contrast II





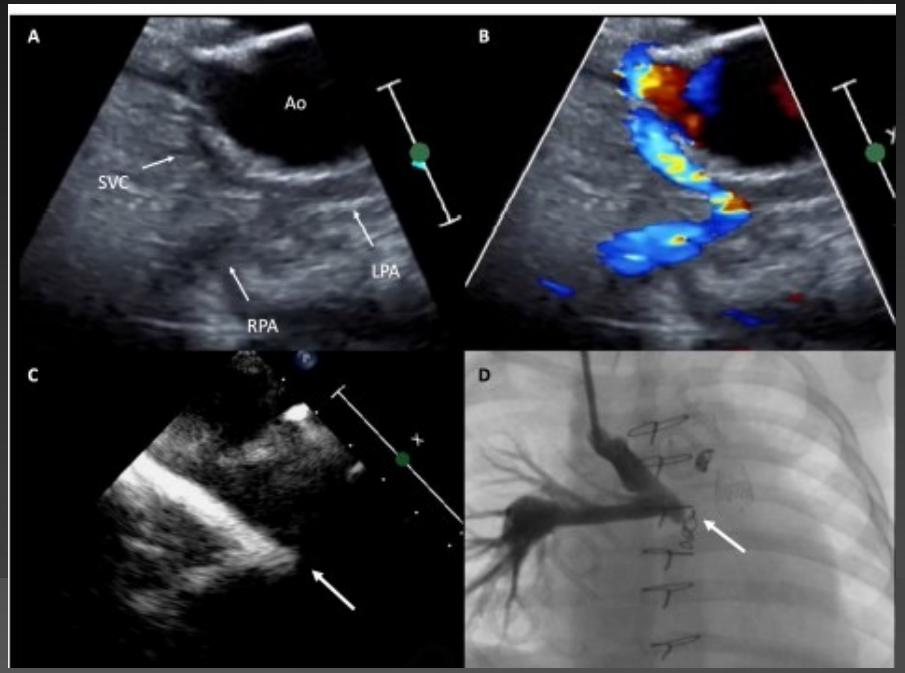


Courtesy Dr. Lindsay Rogers

Journal Pre-proof

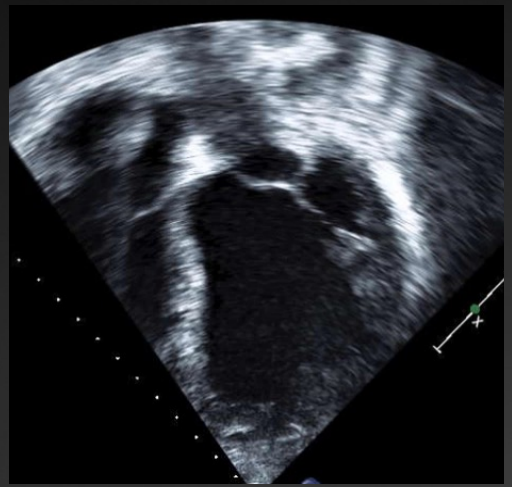
Novel Utilization of Ultrasound Enhancing Agents in Complex Congenital Heart Disease Following Superior Cavopulmonary Connection

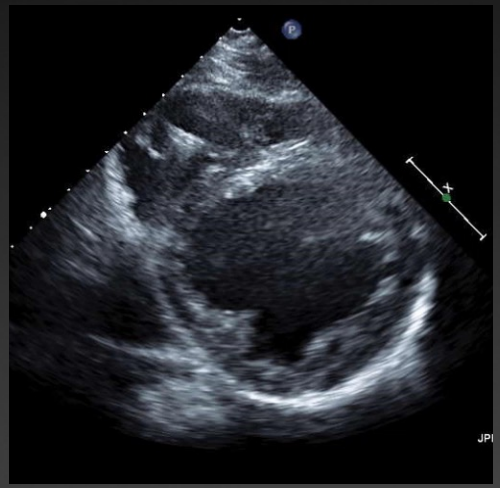
Kasey J. Chaszczewski, MD, Jarett R. Linder, MD MS, Matthew J. Campbell, MD, Michael Convery, RDCS, Yan Wang, RDCS, Christopher L. Smith, MD PhD, Benjamin W. Kozyak, MD, Michael D. Quartermain, MD, FASE

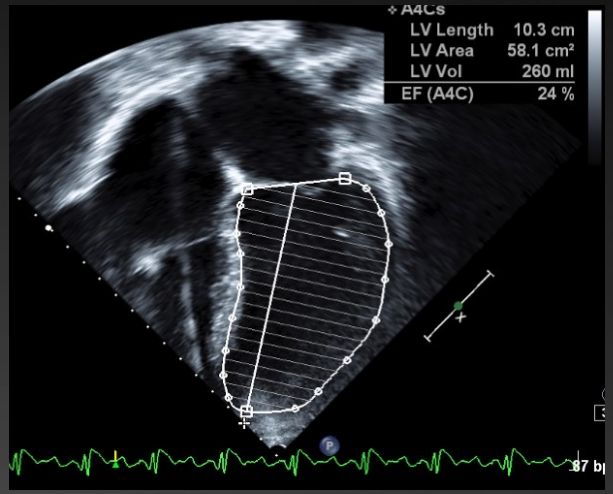


Strain to evaluate dyssynchrony and guide pacing

22 yo, chaotic infantile atrial tachycardia (chaotic), several ablation procedures
Sinus node dysfunction, then CHB → pacemaker
Pacer induced cardiomyopathy with LV dysfunction

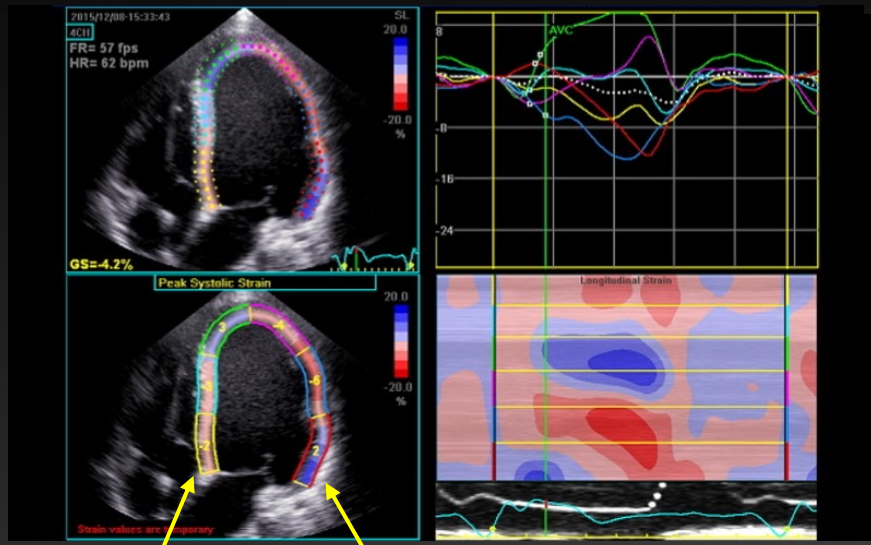


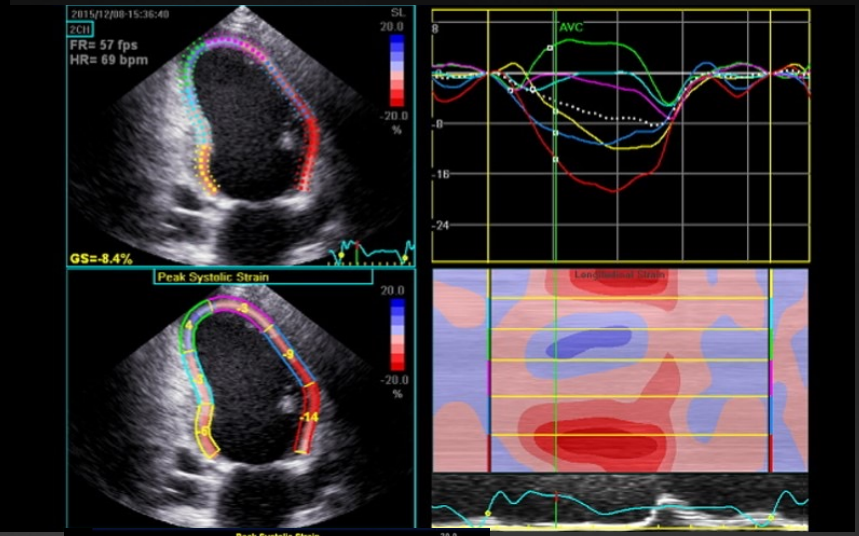


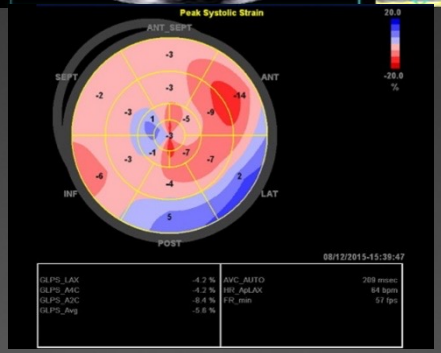


Courtesy Yan Wang

Strain to evaluate dyssynchrony and guide pacing





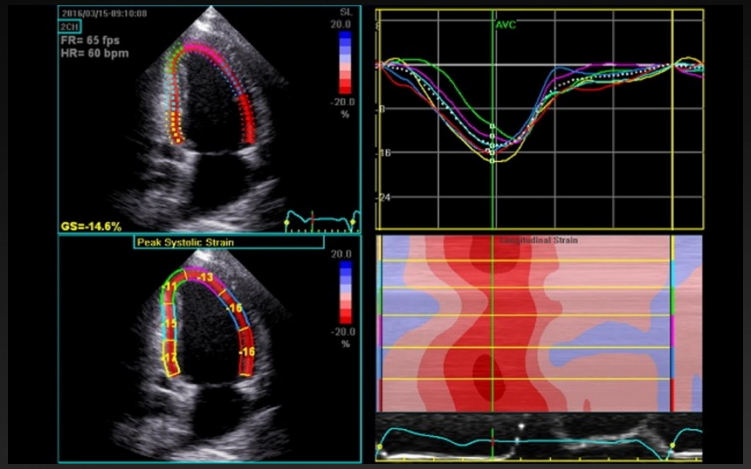


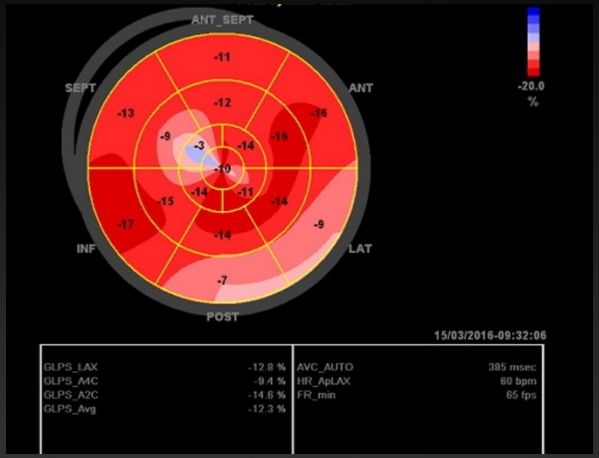
Contracting

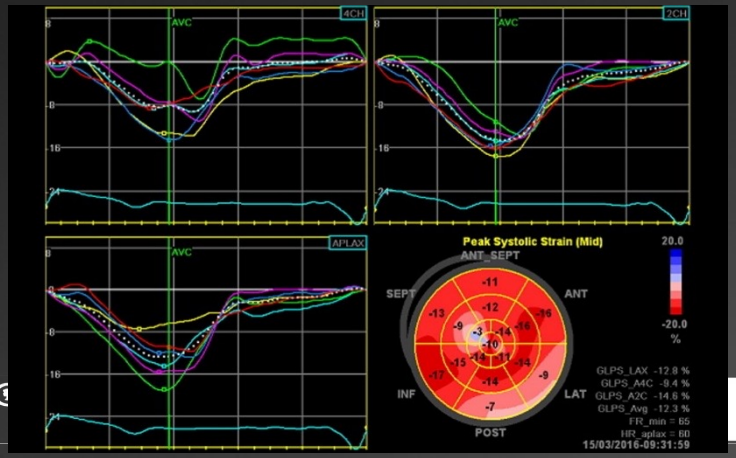
Stretching

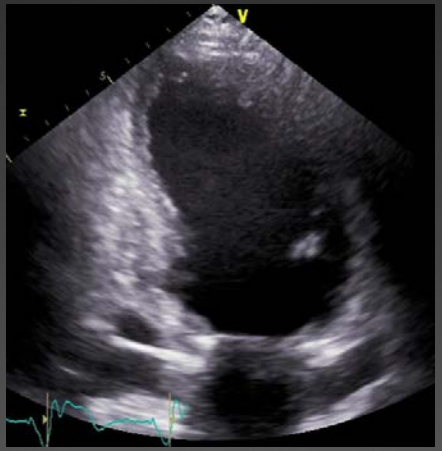
GLS LV -5.6%

After LV lead placement







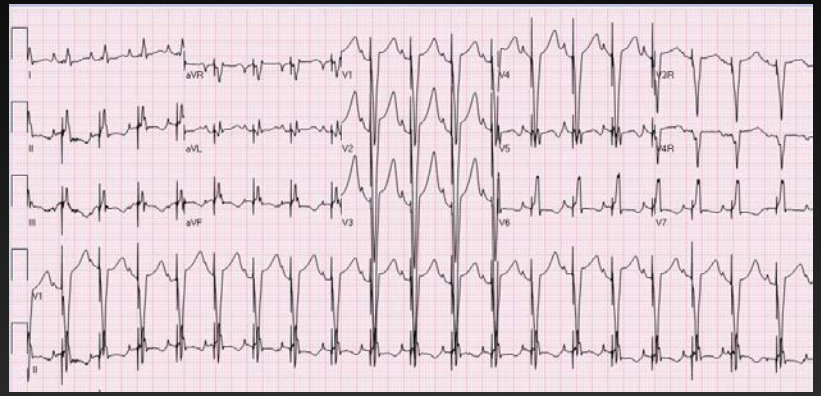


- CRT with placement of ventricular lead after echo
- Significant improvement
- No dyssynchrony

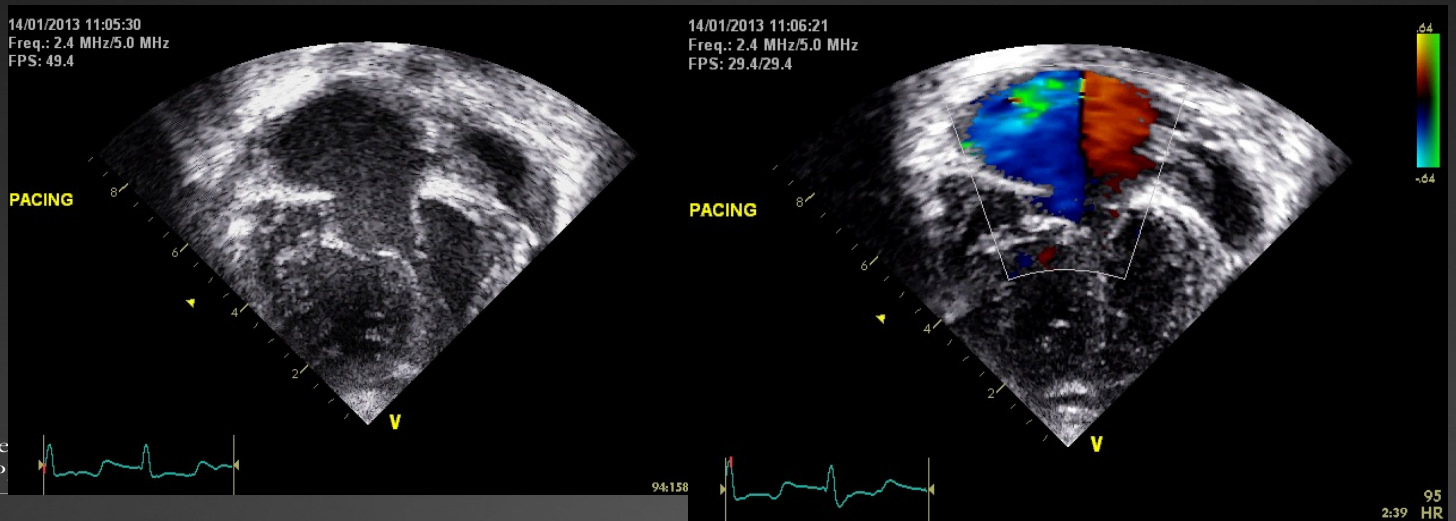
Courtesy Dr. Yan Wang

7 m boy, LAI, unbalanced AVSD, A-V block paced, s/p Kawashima, not doing well – evaluate dyssynchrony

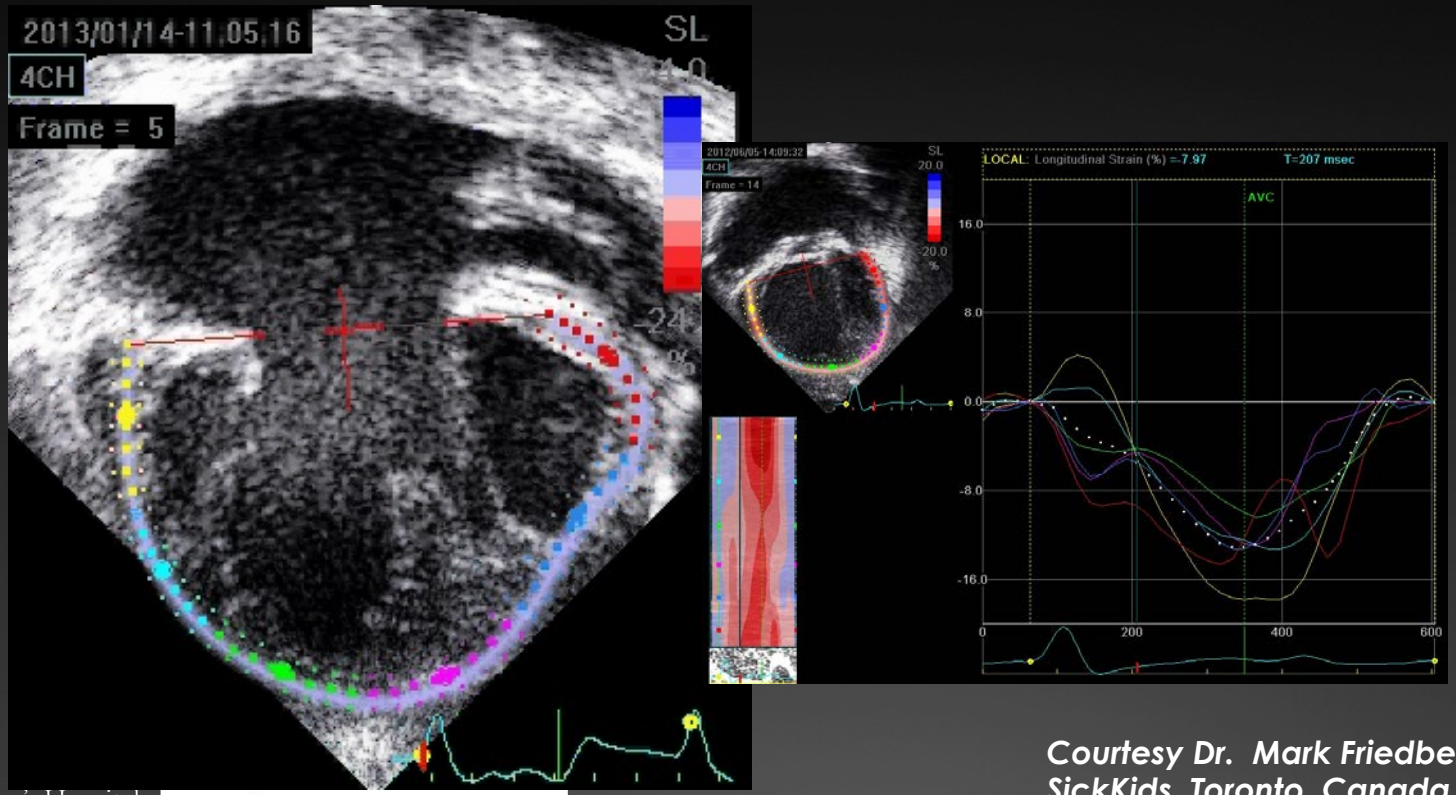
QRS 126 msec



Courtesy Dr. Mark Friedberg
SickKids, Toronto, Canada



7 m boy, LAI, unbalanced AVSD, A-V block paced, s/p Kawashima, not doing well – evaluate dyssynchrony

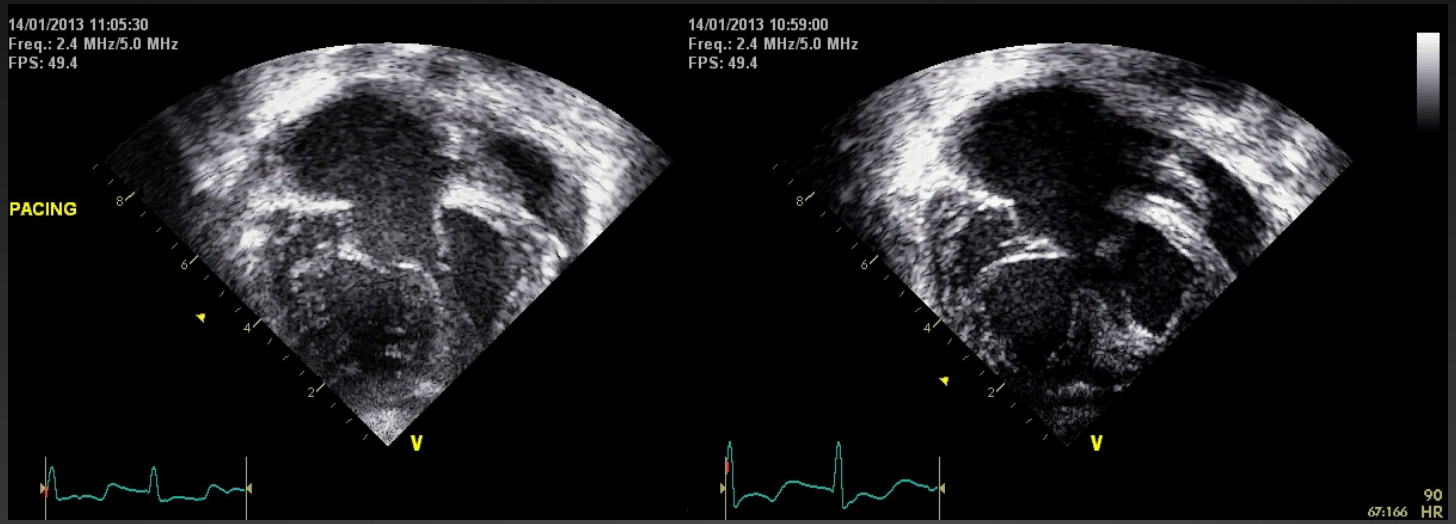


Courtesy Dr. Mark Friedberg
SickKids, Toronto, Canada

7 m boy, LAI, unbalanced AVSD, A-V block paced, s/p Kawashima, not doing well – evaluate dyssynchrony

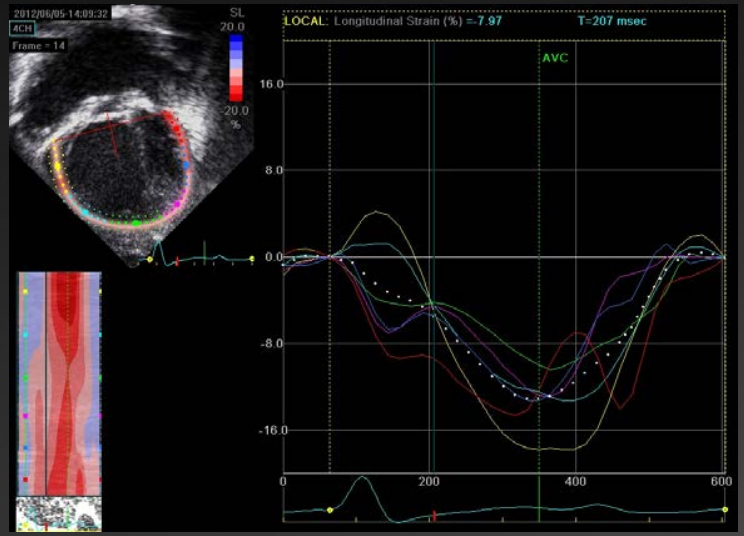
Pacing On

Pacing Off



7 m boy, LAI, unbalanced AVSD, A-V block paced, s/p Kawashima, not doing well – evaluate dyssynchrony

Pacing On



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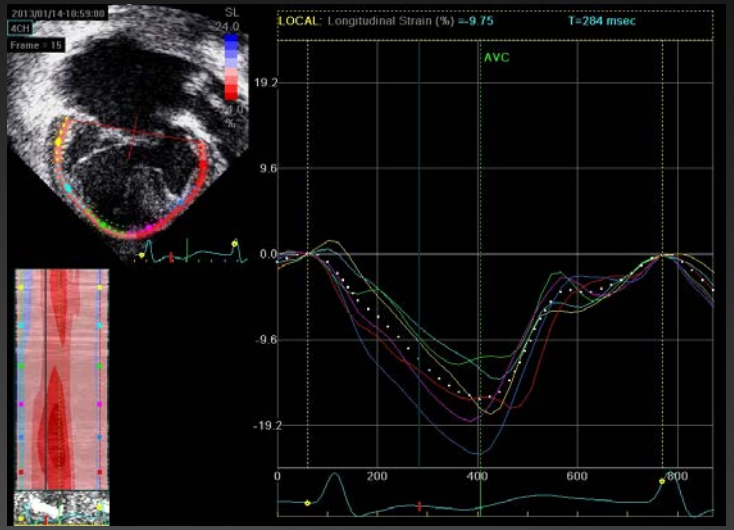

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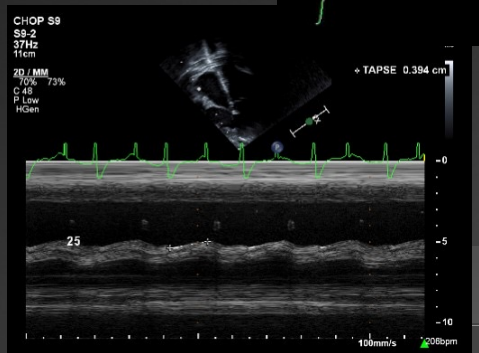
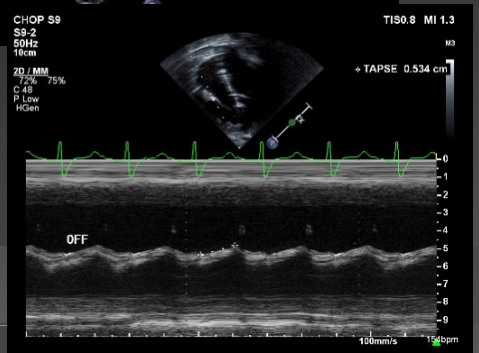
Courtesy Dr. Mark Friedberg
SickKids, Toronto, Canada

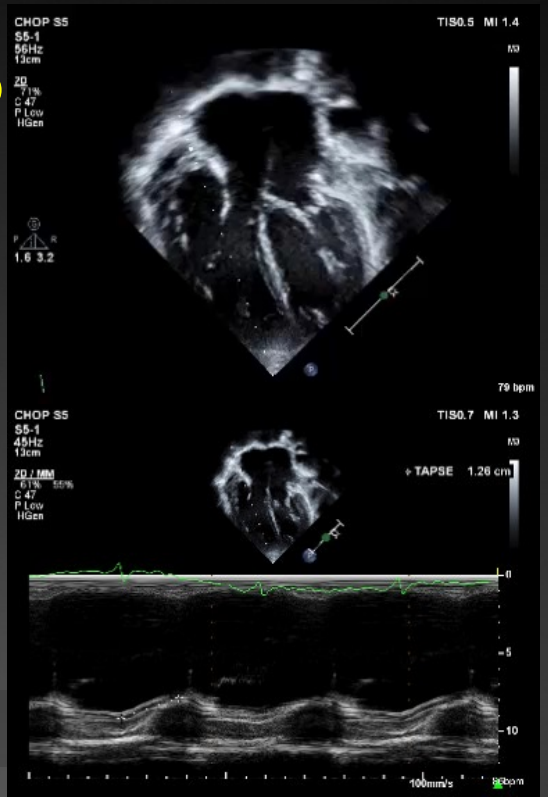
TAPSE to guide RV functional assessment during ECMO turndown

ECMO





Follow up

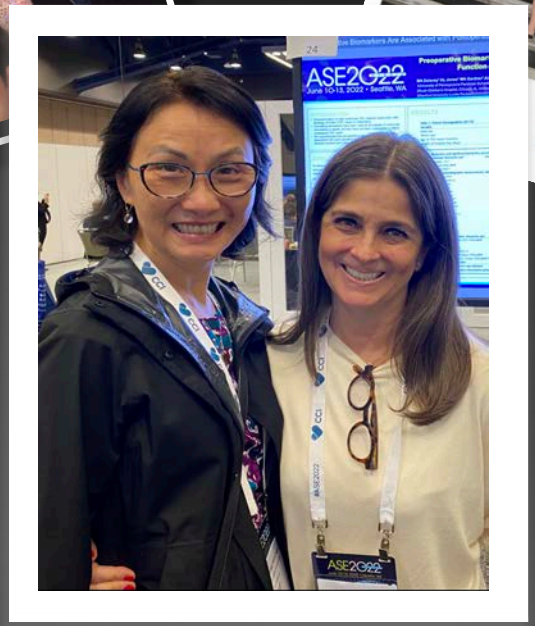


Final considerations

Use of advanced echo (or not… TAPSE!):

- Can guide decision making at the bedside
  - contrast, TAPSE
- Can modify treatment (CRT)
- Etiology (X plane)
- Help surgical planning and strategy (3D)

Thank you!!


ASE2G22
June 10-13, 2022 • Seattle, WA
ASE2G22


Children's Hospital of Philadelphia
Cardiac Echo Lab at CHOP – Faculty and Sonographers
April 27, 2017