

Hodnotenie pravej komory pri VCHS

-limitácie i napriek multimodalitnému prístupu

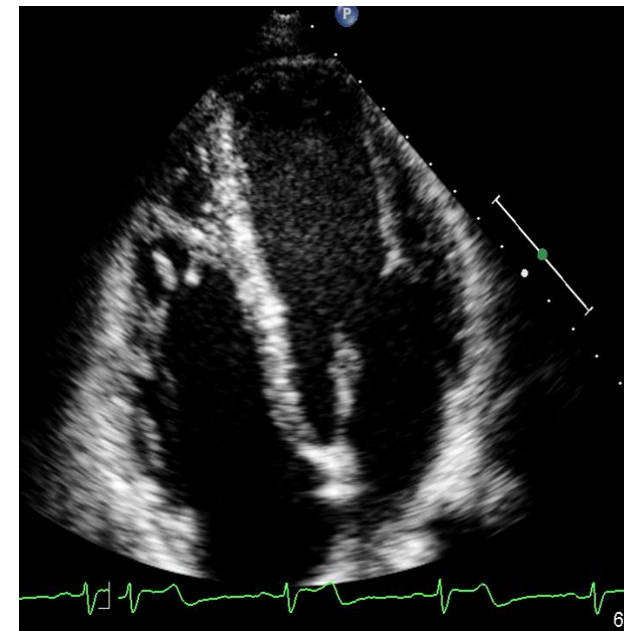
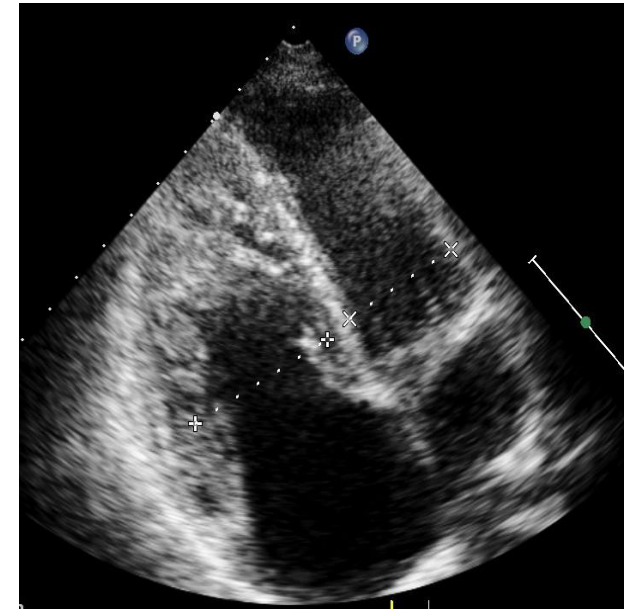
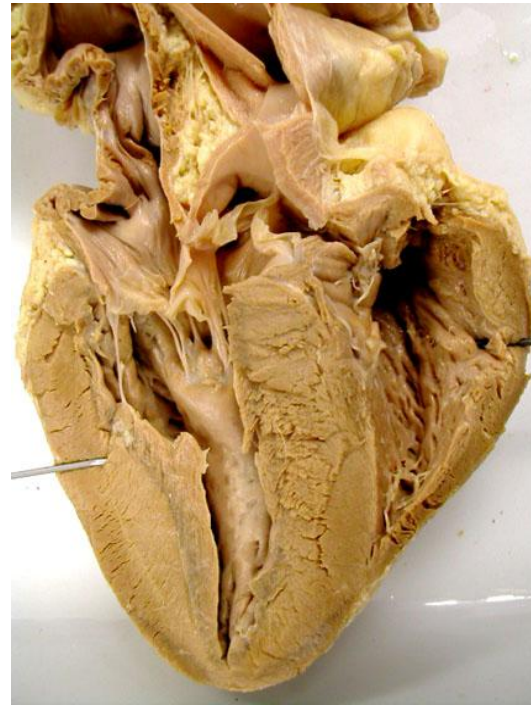
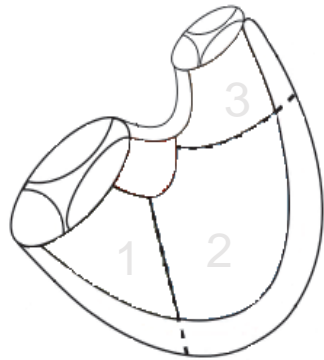


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Špecifiká PK

Morfológia



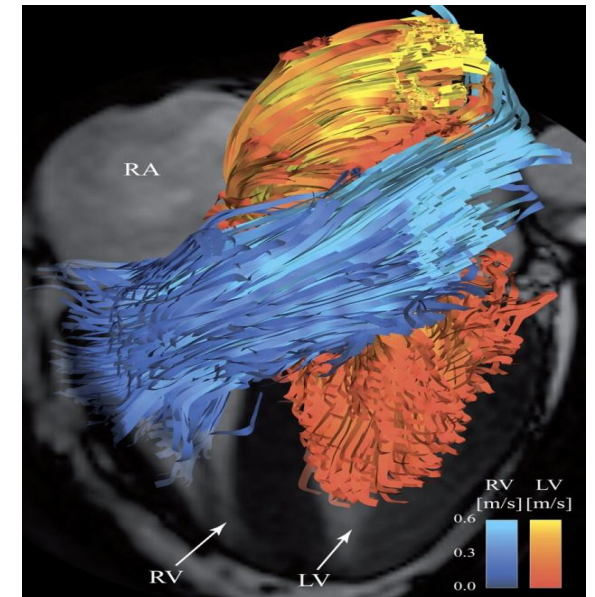
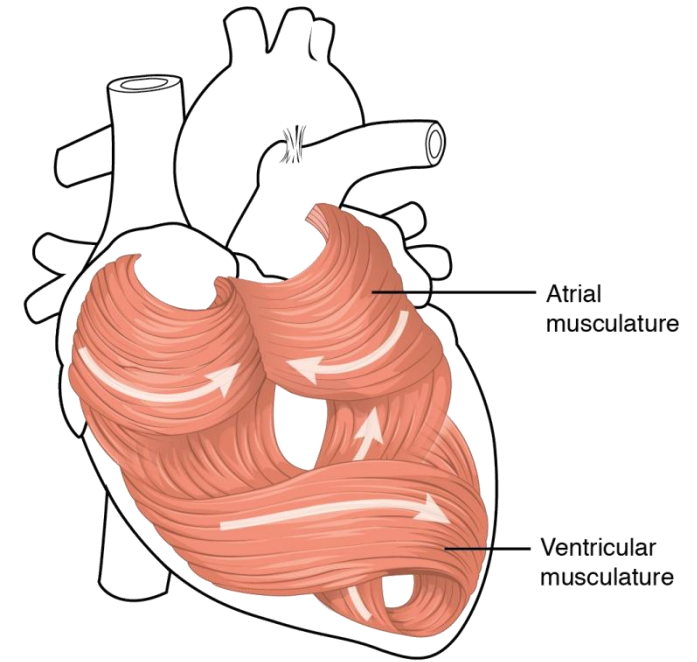
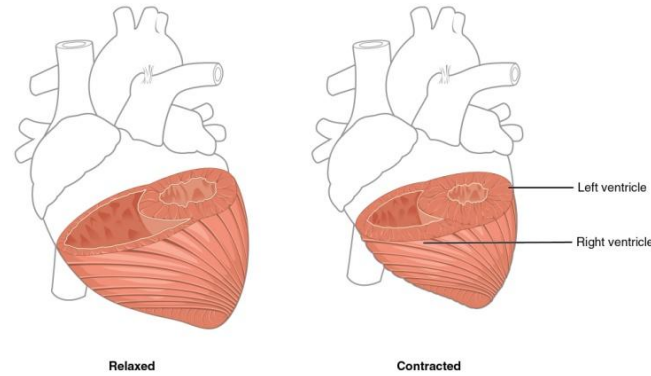
Anatomický tvar:

- komplexný, trojuholníkový až polmesiakový
- 1-vtoková 2-hrotová trabekulárna 3-výtoková infudibulárna
- väčší objem, 1/6 masy LK, stena 3-4 mm
- trabekularizácia hrotu, „moderator band“
- Tr chlopňa s 3 papilárnymi svalmi a 1 úponom na IVS

Špecifiká PK

Histológia

- tenšia stena, „slabšie“ myocyty
- špecifiká subcelulárnych procesov: odlišné káliové kanály, nižšia kontraktilná rezerva PK oproti ĽK
- 2 vrstvy svaloviny : povrchová - cirkumferenciálna
hlboká – longitunálna
- RVOT samostatné anat./funkčné usporiadanie
- interdependencia komôr

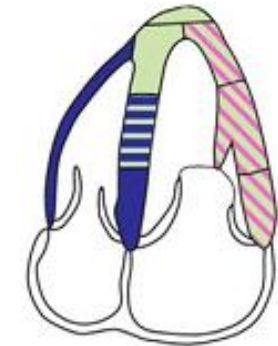
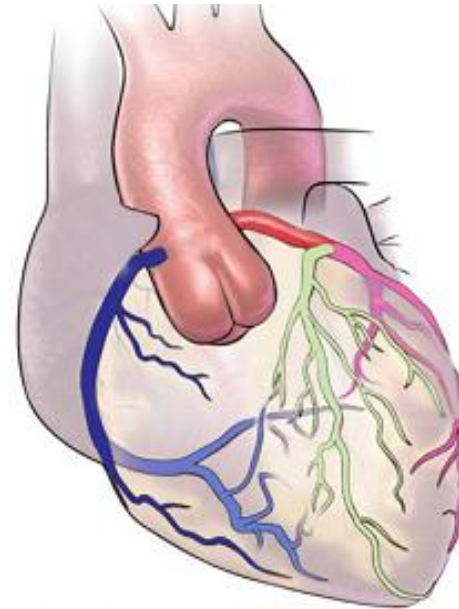
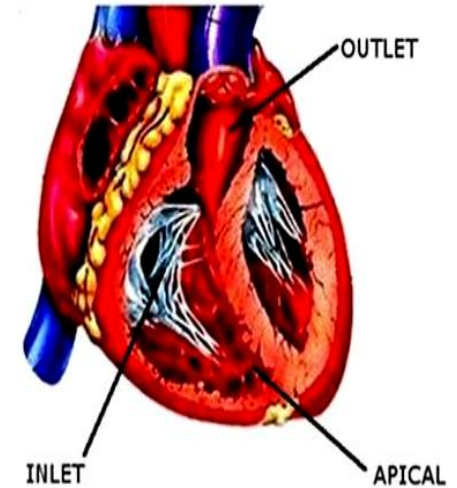
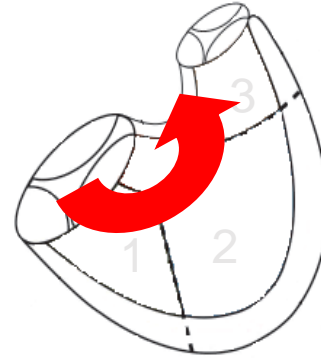


Špecifiká PK

Kontraktilita - sekvenčná (inlet-hrot-výtok)

Perfúzia - duálna

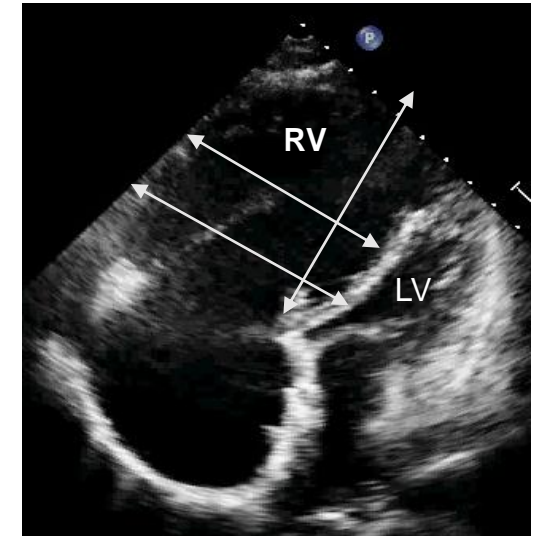
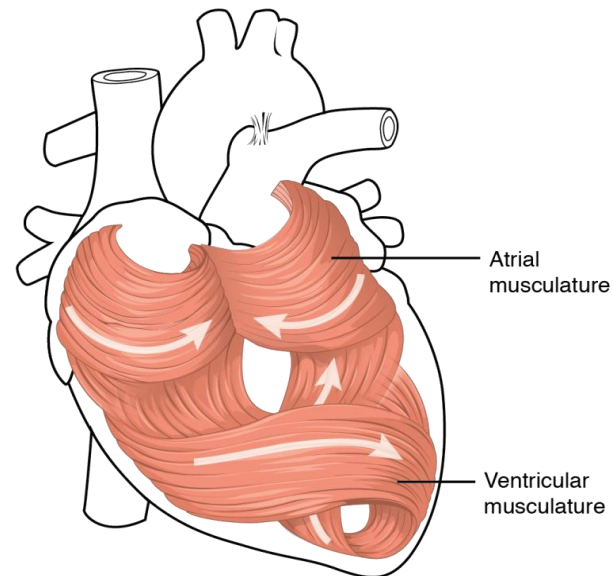
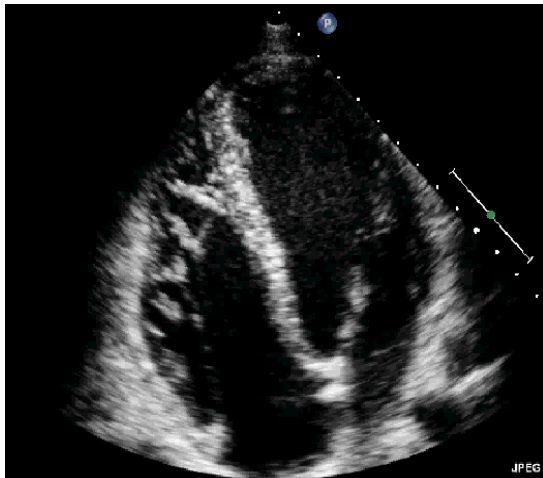
- 80% PK zásobenie z **PKA**
- predná stena PK zásobovaná **RIA** ĽKA
- výtoková infundibulárna časť - vlastná konálna vetva
v 30% aj so samostatným odstupom
- kolaterálny obeh medzi PKA - ĽKA
- prietok - proximálnej PKA v systole aj diastole,
- v distálnej PKA v diastole



Limitácie echokg hodnotenia PK

- neexistuje jednoduchý geometrický model na výpočet objemu a stanovenie funkcie PK
- trabekularizácia myokardu, horšia definícia rozhrania endokardu a dutiny
- špecifická kontraktilita PK: aktívne kontrakcie v pozdĺžnom smere

minimálne kontrakcie koncentrické – skôr pasívne a systolické zhrubnutie steny



GUIDELINES AND STANDARDS

Guidelines for the Echocardiographic Assessment of the Right Heart in Adults: A Report from the American Society of Echocardiography

Endorsed by the European Association of Echocardiography, a registered branch of the European Society of Cardiology, and the Canadian Society of Echocardiography

Lawrence G. Rudski, MD, FASE, Chair, Wyman W. Lai, MD, MPH, FASE, Jonathan Afilalo, MD, MSc, Lanqi Hua, RDCS, FASE, Mark D. Handschumacher, BSc, Krishnaswamy Chandrasekaran, MD, FASE, Scott D. Solomon, MD, Eric K. Louie, MD, and Nelson B. Schiller, MD, *Montreal, Quebec, Canada; New York, New York; Boston, Massachusetts; Phoenix, Arizona; London, United Kingdom; San Francisco, California*

(J Am Soc Echocardiogr 2010;23:685-713.)

GUIDELINES AND STANDARDS

Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging

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to eliminate several minor discrepancies that existed between previously published guidelines. (J Am Soc Echocardiogr 2015;28:1-39.)



European Heart Journal – Cardiovascular Imaging (2015) 16, 47–52
doi:10.1093/ehjci/jeu156

Traditional and innovative echocardiographic parameters for the analysis of right ventricular performance in comparison with cardiac magnetic resonance

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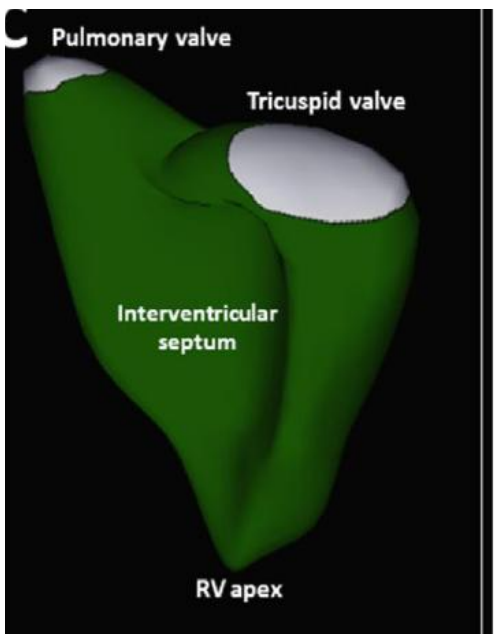
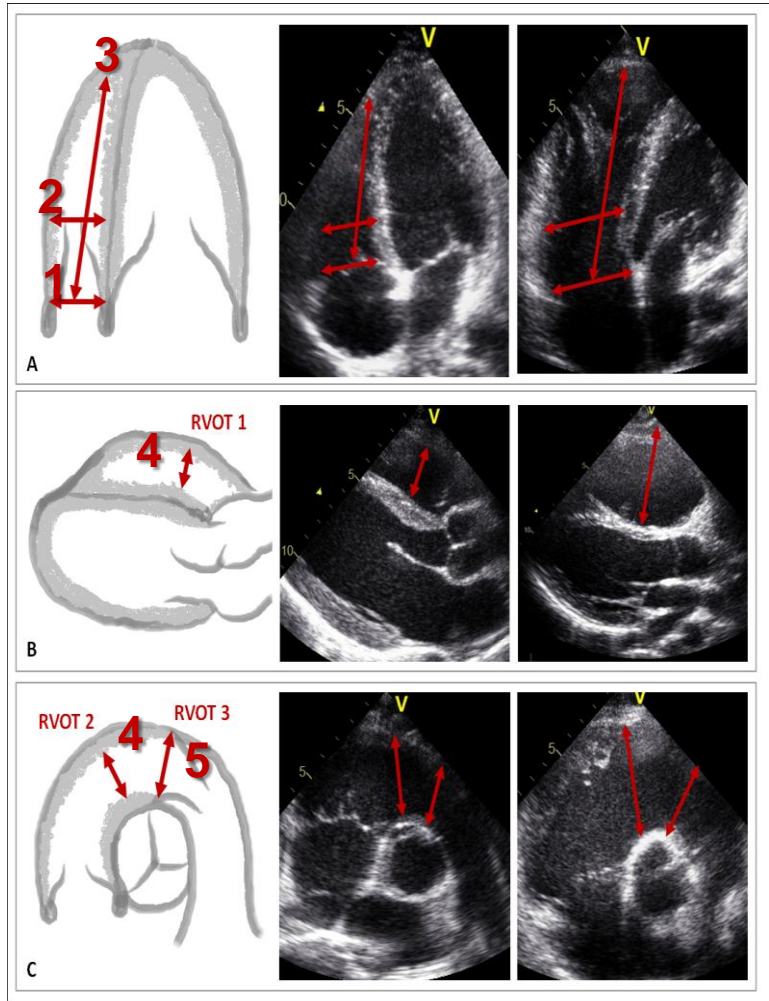
Hodnotenie veľkosti PK

ECHOKG:

- 2D:
- | | |
|-------------------|--|
| 1. RV bazál. | > 41-42 mm |
| 2. RV midventrik. | > 35 mm (RV/LV > 1) |
| 3. RV longitud. | > 83-86 mm |
| 4. RVOT prox. | > 33-35 mm (>22mm/m ²) |
| 5. RVOT dist. | > 27 mm |
| 6. RV EDAi - M | > 12.6 cm ² /m ² BSA |
| - F | > 11.5 cm ² /m ² BSA |
| 7. RV ESAi - M | > 7.4 cm ² /m ² BSA |
| - F | > 6.4 cm ² /m ² BSA |

3D: volumetria / funkcia

- | | |
|----------------|------------------------|
| 8. RV EDVi - M | > 87 ml/m ² |
| - F | > 74 ml/m ² |
| 9. RV ESVi - M | > 44 ml/m ² |
| - F | > 36 ml/m ² |



Hodnotenie veľkosti PK

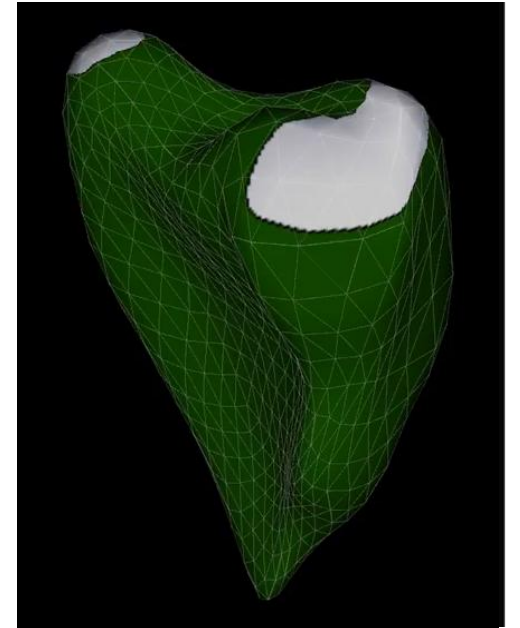
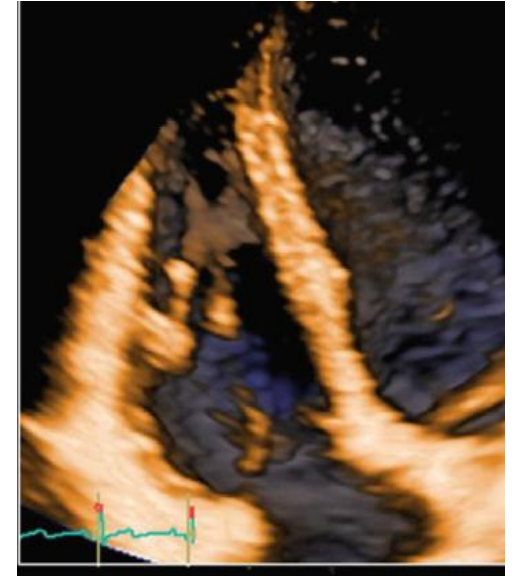
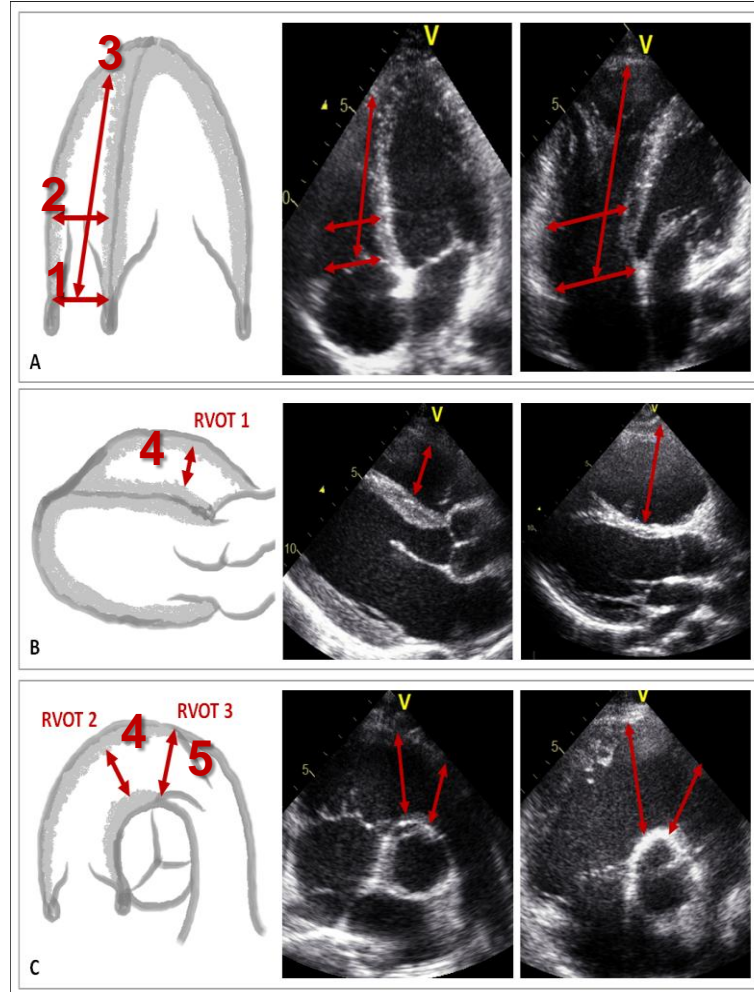
..... závislé od preloadu

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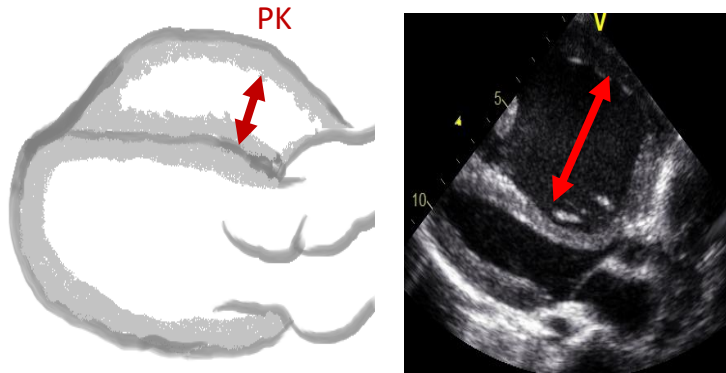
- 2D:
- | | | |
|----|----------------|--|
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| 6. | RV EDAi - M | > 12.6 cm ² /m ² BSA |
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3D: volumetria / funkcia

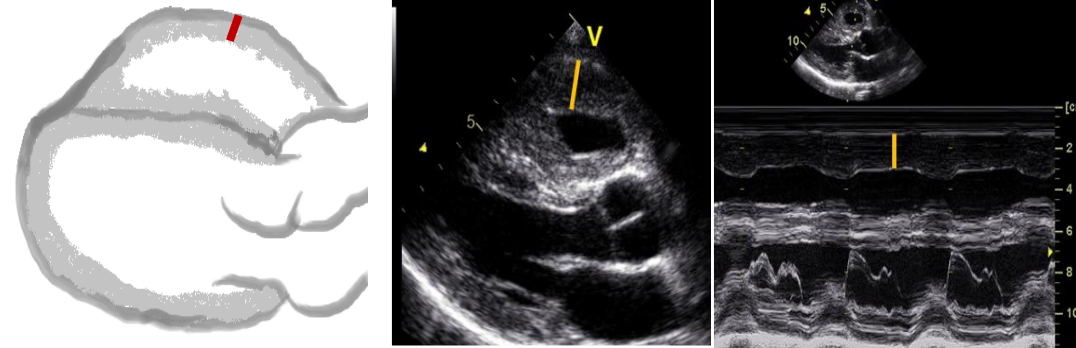
- | | | |
|----|-------------|------------------------|
| 8. | RV EDVi - M | > 87 ml/m ² |
| | - F | > 74 ml/m ² |
| 9. | RV ESVi - M | > 44 ml/m ² |
| | - F | > 36 ml/m ² |



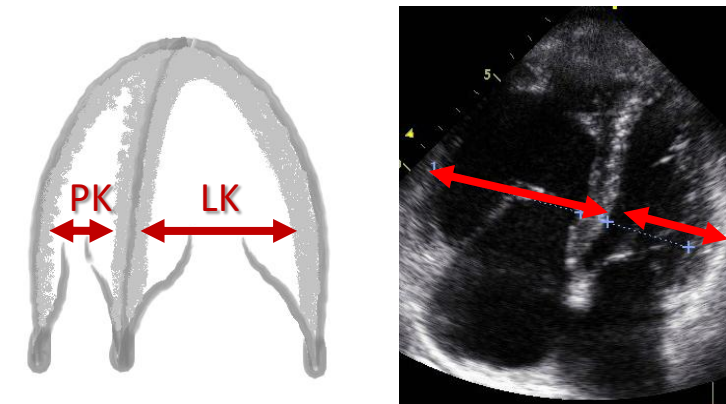
Hodnotenie veľkosti PK



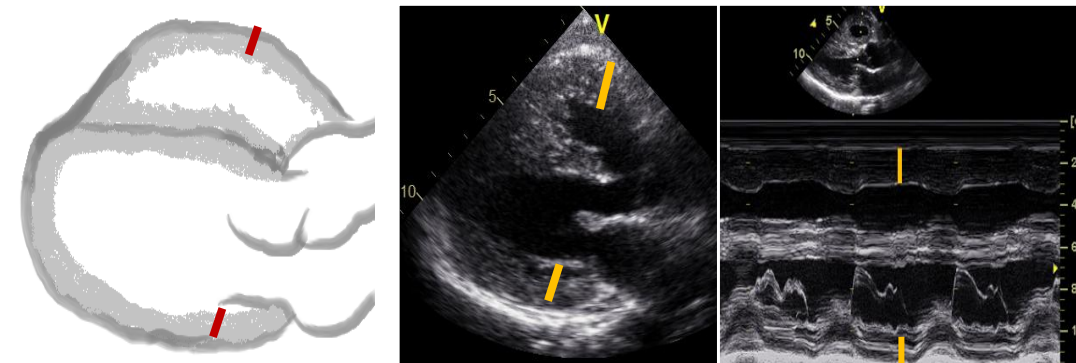
PK (LAX) > 33 mm (22 mm/m²)



hrúbka steny PK > 5mm



PK/LK (4CA) > 1

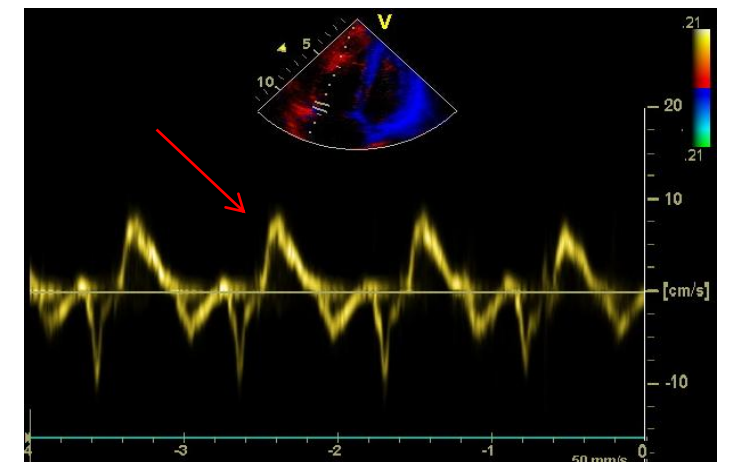
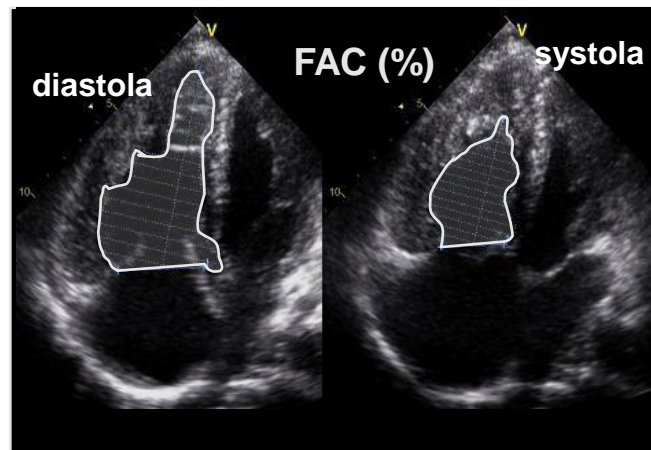
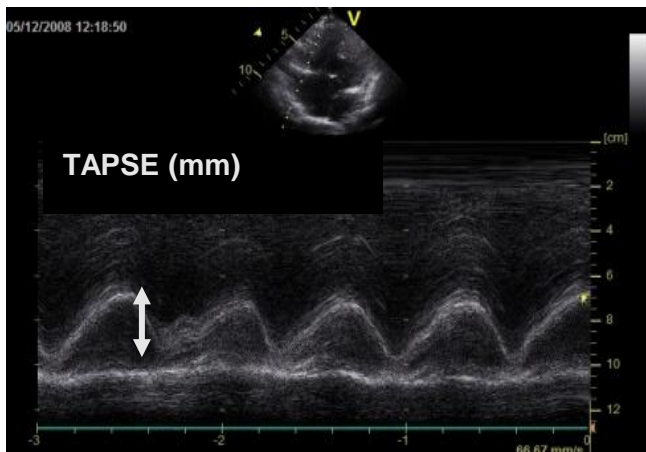
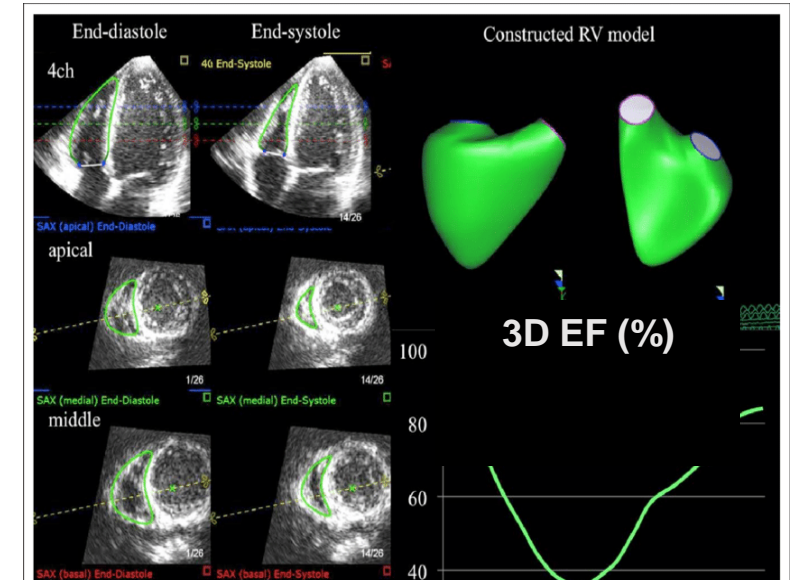


pomer hrúbky steny PK / steny LK
pomer masy PK / dutina PK

Hodnotenie funkcie PK

Systolická dysfunkcia

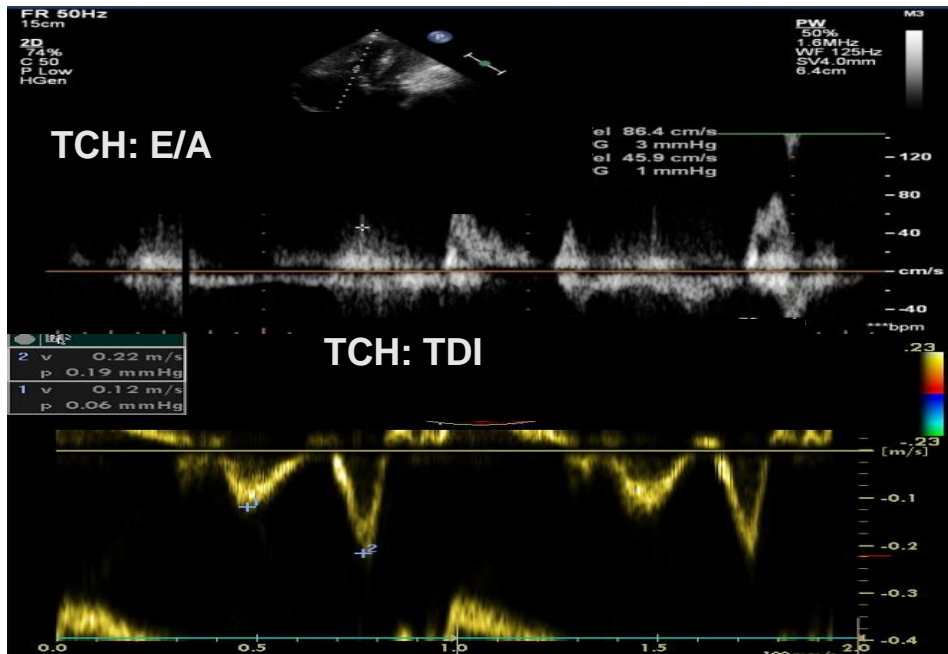
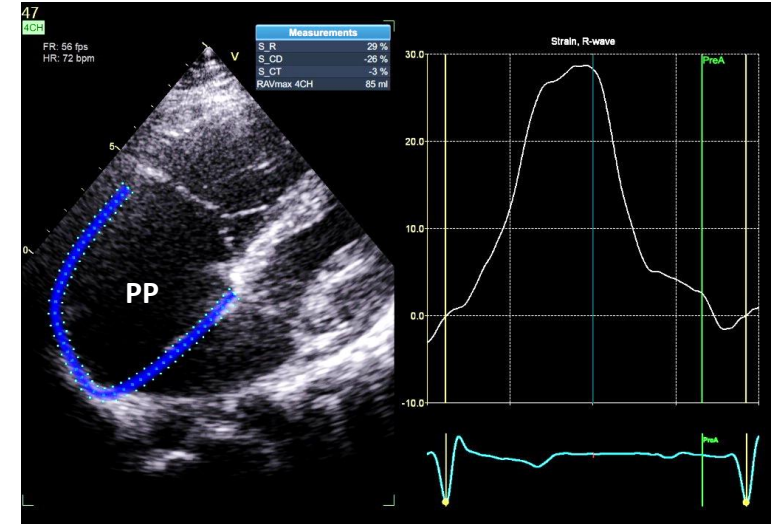
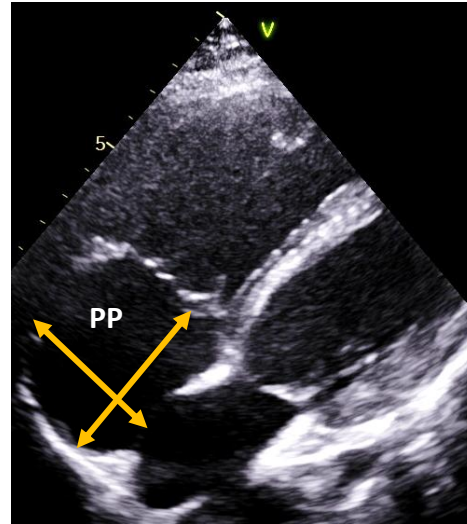
- TAPSE < 17mm
- FAC < 35%
- TDI S' < 9,5 cm/s
- EF PK (3D) < 45%



Hodnotenie funkcie PK

Diastolická dysfunkcia

- E/A TV, E/E', DT E', IVRT
- veľkosť + f. PP
- Strain PP

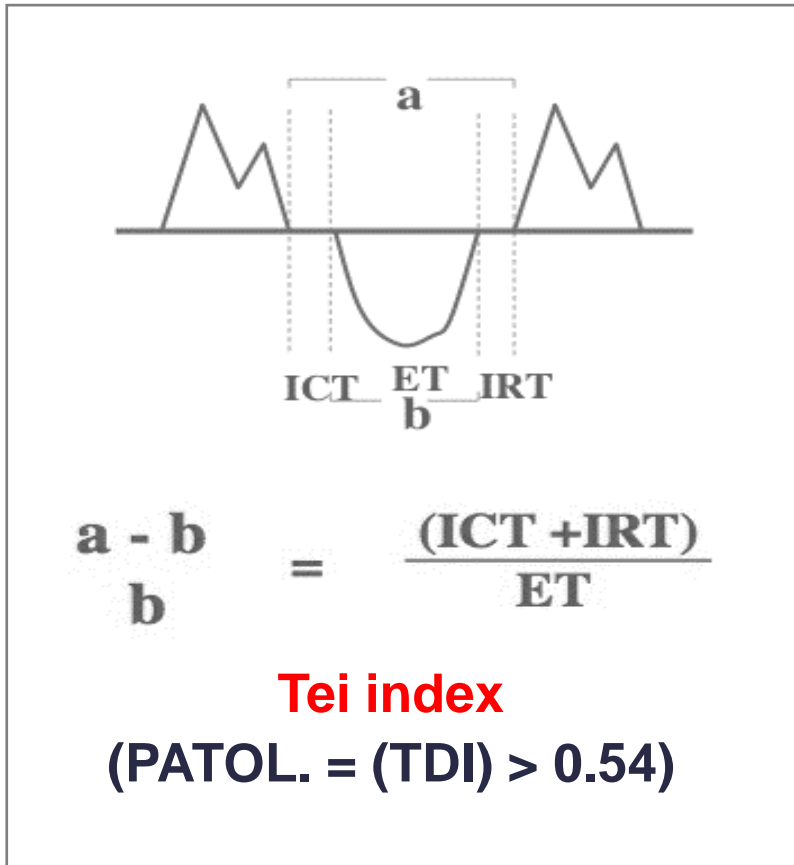


	Women	Men
RA minor axis dimension (cm/m ²)	1.9 ± 0.3	1.9 ± 0.3
RA major axis dimension (cm/m ²)	2.5 ± 0.3	2.4 ± 0.3
2D echocardiographic RA volume (mL/m ²)	21 ± 6	25 ± 7

Lang et al., JASE 2015
M: 1,9cm/m²
Ž: 1,6cm/m²

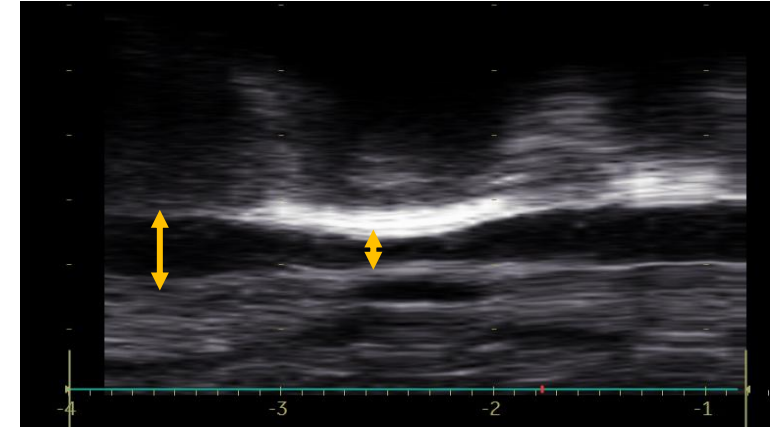
Hodnotenie funkcie PK

Globálna funkcia

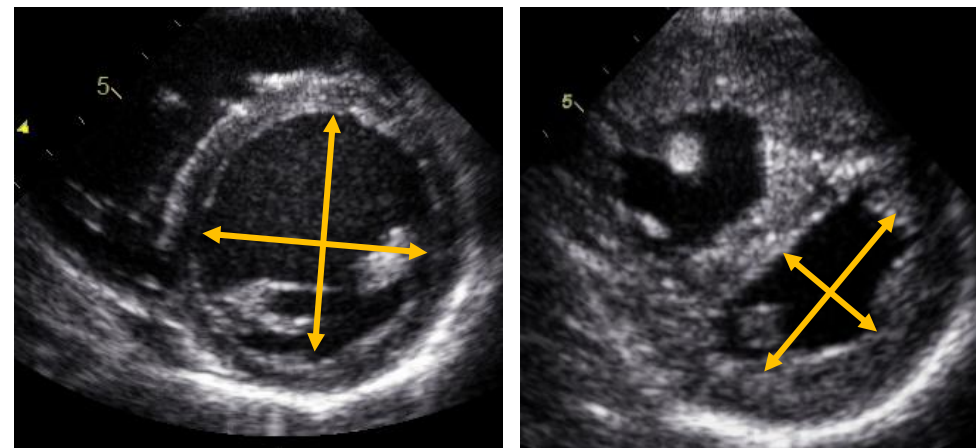


- +
 - IVC + respir. variabilita
 - index excentricity LK
 - odhad tlaku v PK / PAP
 - prít. perikard. exsud.

IVC- respir. variabilita



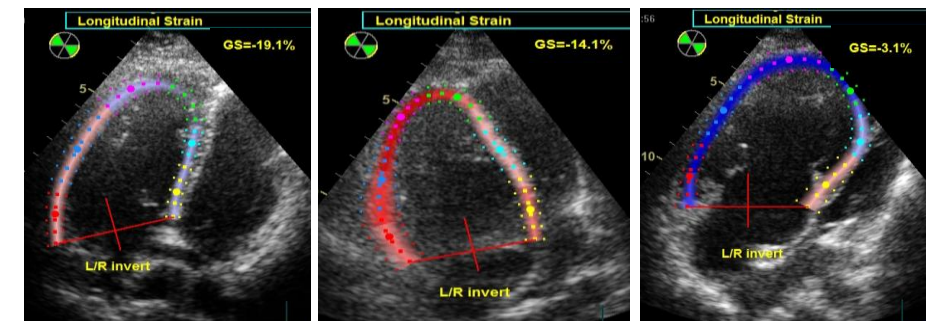
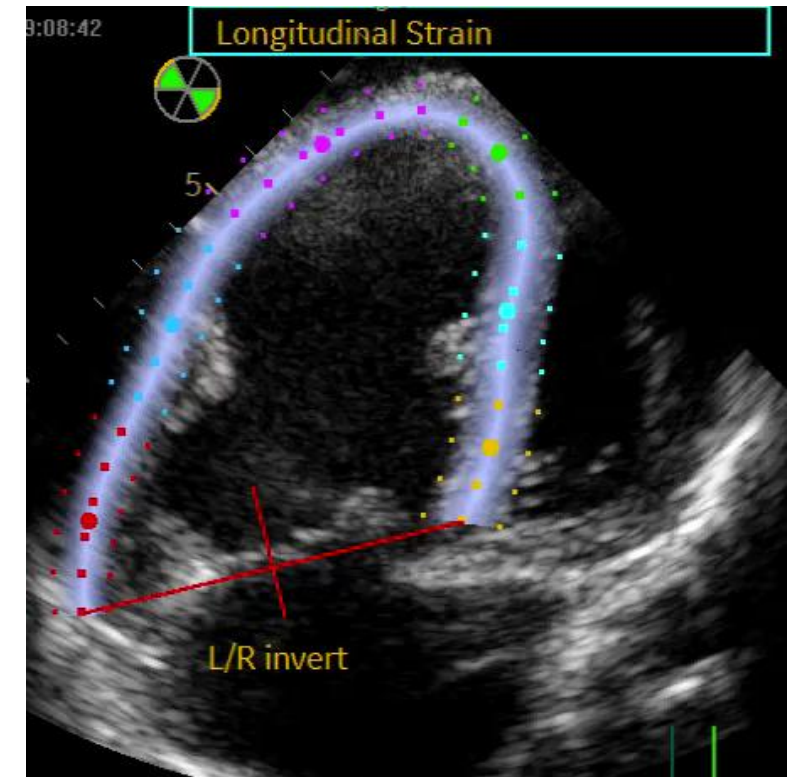
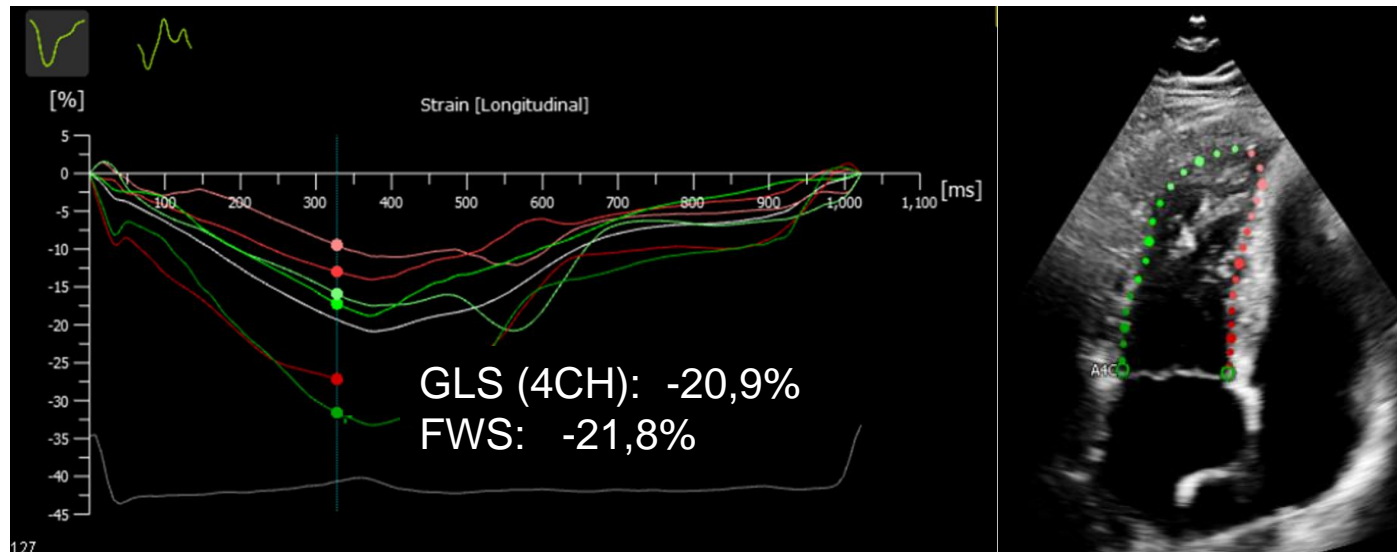
Index excentricity LK



Hodnotenie funkcie PK

2D „speckle tracking“ PK:

- globál. longitud. strain (GLS) $N \leq -17\%$ ($M \leq -20\%$ / $F \leq -20.3\%$)
- „free wall“ longitud. strain (FWS) $N \leq -19\%$ ($M \leq -22.5\%$ / $F \leq -23.3\%$)



Echokg hodnotenie PK

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to eliminate several minor discrepancies that existed between previously published guidelines. (J Am Soc Echocardiogr 2015;28:1-39.)

Table 10 Normal values for parameters of RV function

Parameter	Mean \pm SD	Abnormality threshold
TAPSE (mm)	24 \pm 3.5	<17
Pulsed Doppler S wave (cm/sec)	14.1 \pm 2.3	<9.5
Color Doppler S wave (cm/sec)	9.7 \pm 1.85	<6.0
RV fractional area change (%)	49 \pm 7	<35
RV free wall 2D strain* (%)	-29 \pm 4.5	>-20 (<20 in magnitude with the negative sign)
RV 3D EF (%)	58 \pm 6.5	<45
Pulsed Doppler MPI	0.26 \pm 0.085	>0.43
Tissue Doppler MPI	0.38 \pm 0.08	>0.54
E wave deceleration time (msec)	180 \pm 31	<119 or >242
E/A	1.4 \pm 0.3	<0.8 or >2.0
e'/a'	1.18 \pm 0.33	<0.52
e'	14.0 \pm 3.1	<7.8
E/e'	4.0 \pm 1.0	>6.0

MPI, Myocardial performance index.

Table 8 Normal values for RV chamber size

Parameter	Mean \pm SD	Normal range
RV basal diameter (mm)	33 \pm 4	25-41
RV mid diameter (mm)	27 \pm 4	19-35
RV longitudinal diameter (mm)	71 \pm 6	59-83
RVOT PLAX diameter (mm)	25 \pm 2.5	20-30
RVOT proximal diameter (mm)	28 \pm 3.5	21-35
RVOT distal diameter (mm)	22 \pm 2.5	17-27
RV wall thickness (mm)	3 \pm 1	1-5
RVOT EDA (cm ²)		
Men	17 \pm 3.5	10-24
Women	14 \pm 3	8-20
RV EDA indexed to BSA (cm ² /m ²)		
Men	8.8 \pm 1.9	5-12.6
Women	8.0 \pm 1.75	4.5-11.5
RV ESA (cm ²)		
Men	9 \pm 3	3-15
Women	7 \pm 2	3-11
RV ESA indexed to BSA (cm ² /m ²)		
Men	4.7 \pm 1.35	2.0-7.4
Women	4.0 \pm 1.2	1.6-6.4
RV EDV indexed to BSA (mL/m ²)		
Men	61 \pm 13	35-87
Women	53 \pm 10.5	32-74
RV ESV indexed to BSA (mL/m ²)		
Men	27 \pm 8.5	10-44
Women	22 \pm 7	8-36

EDA, end-diastolic area; ESA, end-systolic area; PLAX, parasternal long-axis view; RVOT, RV outflow tract.

Echokg hodnotenie PK

➤ echogenita, preload, SF, arytmie, typ. OP korekcie...

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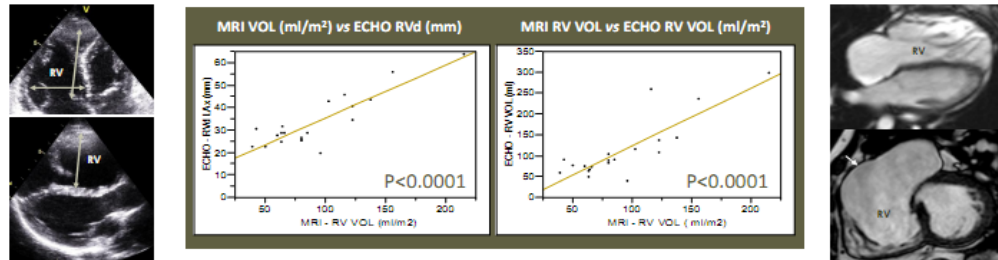
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Women	8.0 \pm 1.75	4.5-11.5
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Men	9 \pm 3	3-15
Women	7 \pm 2	3-11
RV ESA indexed to BSA (cm ² /m ²)		
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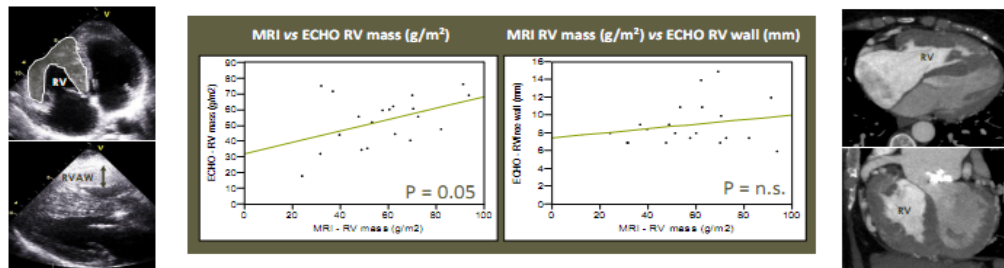
EDA, end-diastolic area; ESA, end-systolic area; PLAX, parasternal long-axis view; RVOT, RV outflow tract.

MRI vs ECHO korelácie

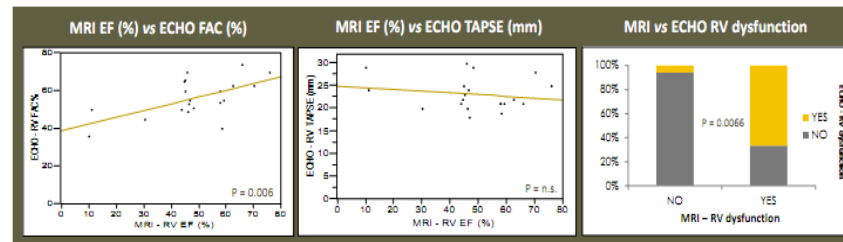
1. **RV dilatation:** good correlation of MRI VOL vs all ECHO measured diameters (best: RV diameter in long-axis-view $P < 0.0001$); as well as ECHO VOL (best: MODEL $P < 0.0001$).



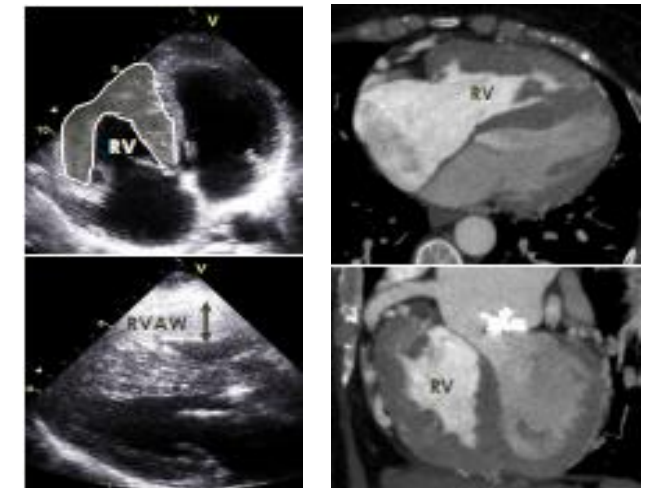
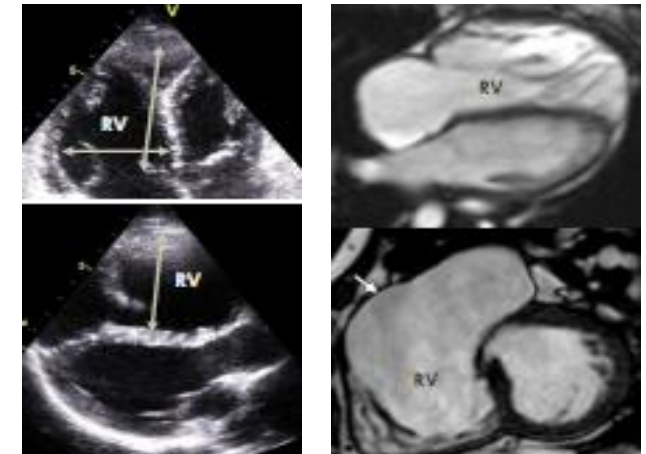
2. **RV hypertrophy:** correlation of MRI MASS vs ECHO MASS ($P = 0.05$); but no correlation with RV free-wall diameter.



3. **RV function:** correlation of MRI EF vs ECHO FAC ($P = 0.006$) but not with TAPSE; best correlation in marked RV dysfunction (MRI EF < 30% vs ECHO FAC < 30%, $P = 0.0066$).



Kaldarárová M, Šimková I. Right ventricle evaluation in Eisenmenger syndrome – MRI or echo? Global Heart Official Journal of the World Heart Federation. 2013 (9): e235-e254 (PT417).



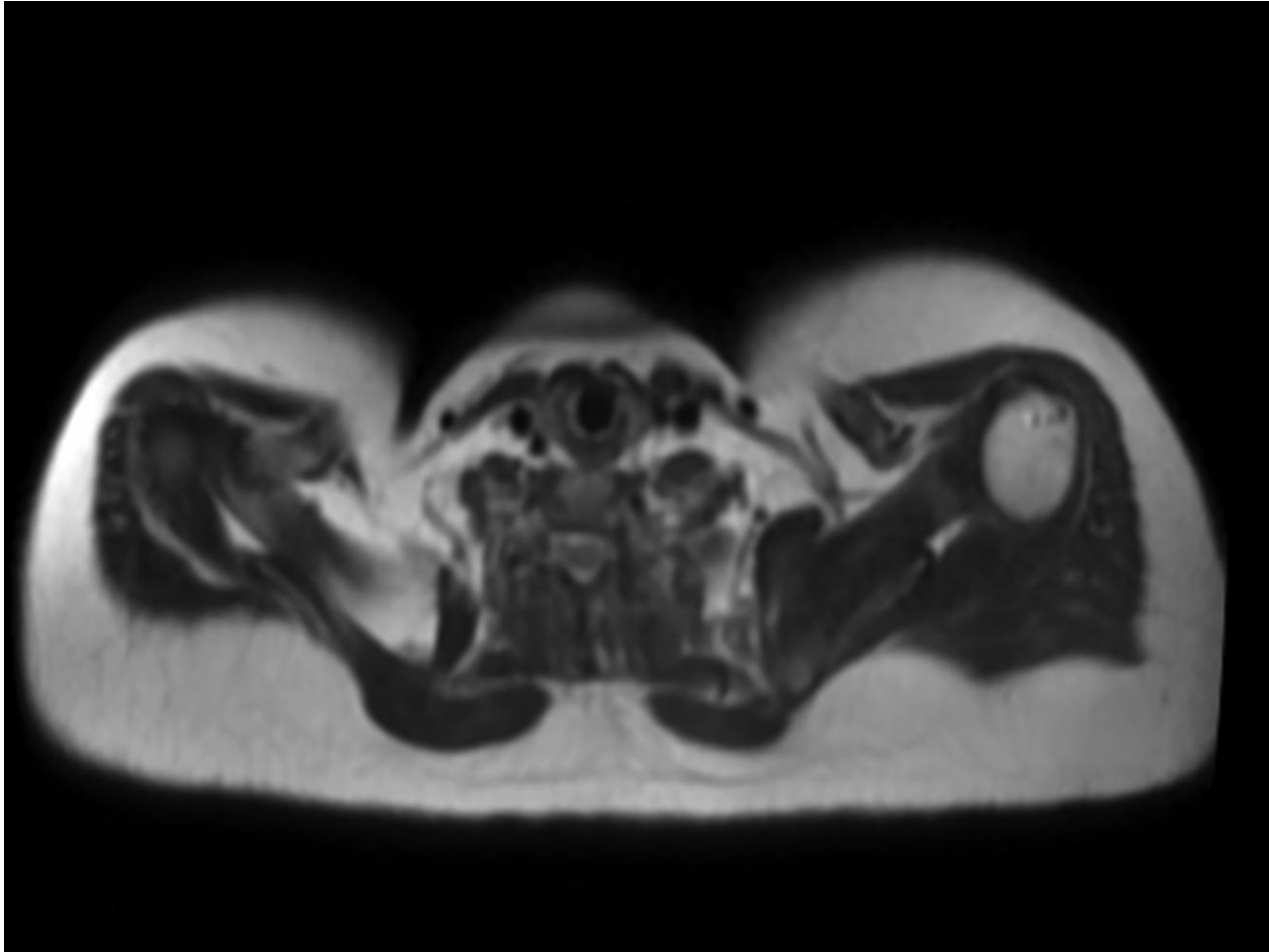
Hodnotenie PK na CMR

EKG
synchronizované
snímanie

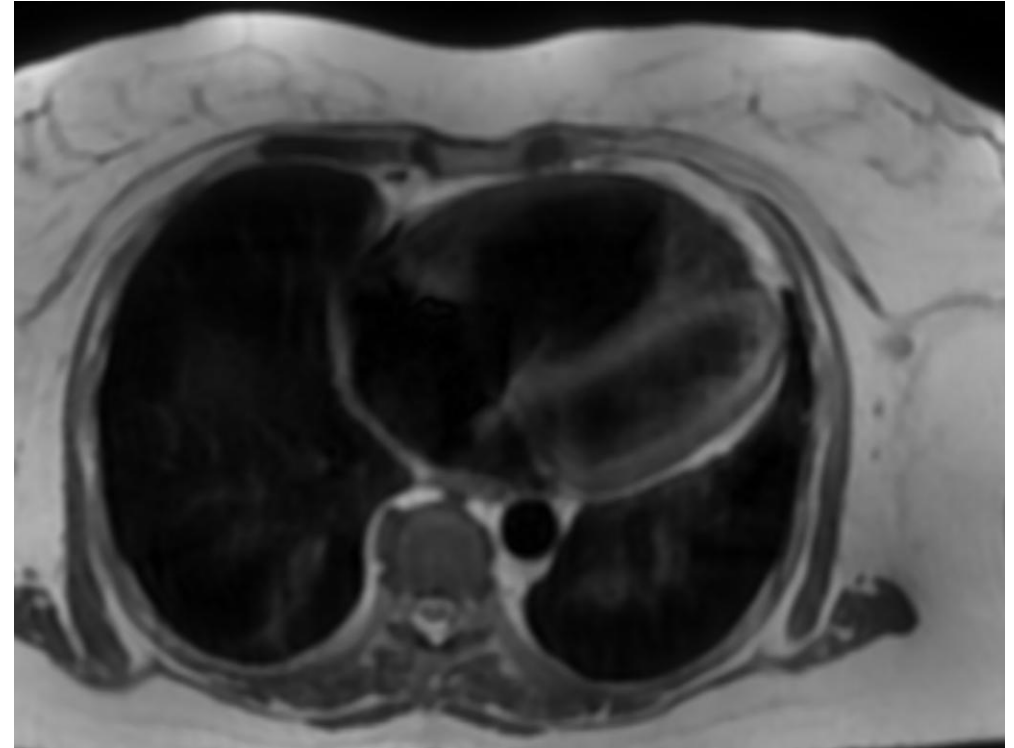
Bez ionizujúceho
žiarenia

Ideálna
zobrazovacia
modalita na
detailné
morfologické,
funkčné informácie
PK, AP-PK spojenie

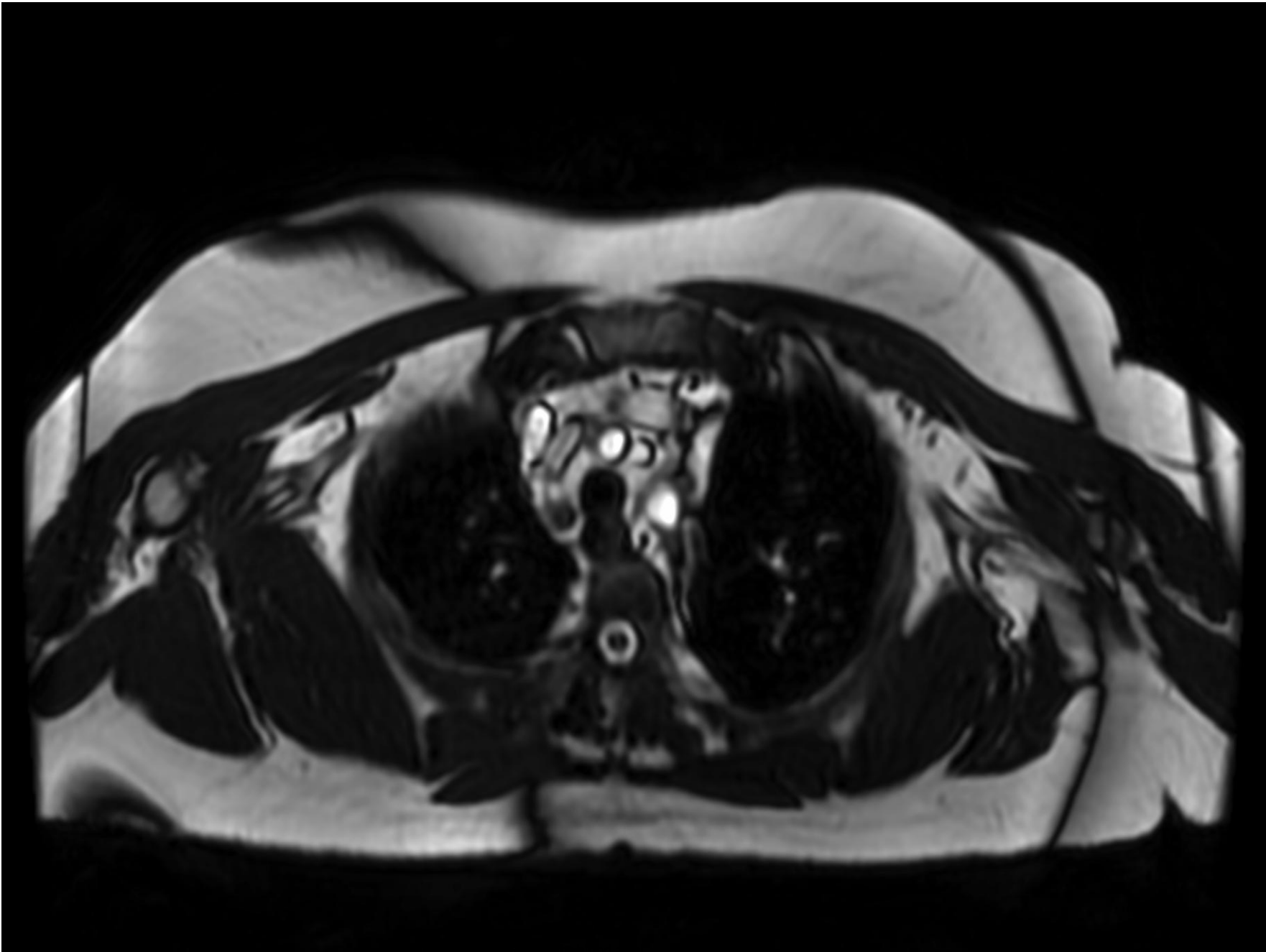
Kvantifikácia
indexovaných
objemov oboch
komôr, masy
myokardu a porúch
kinetiky steny,
prietoky



Dark blood axial

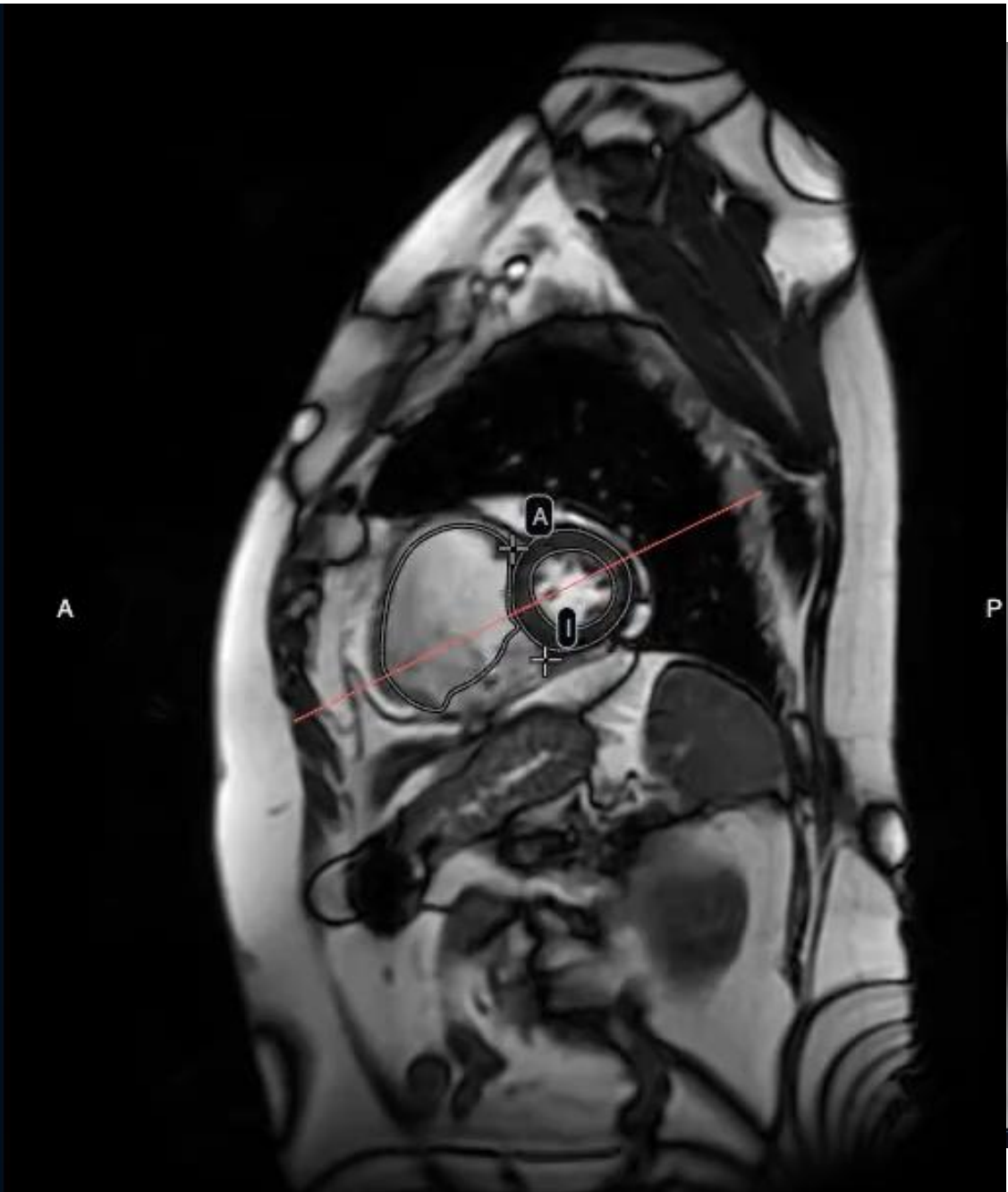


Archív MR NÚSCH



- Zhodnotenie funkcie – (EF, EDV,ESV,SV)

- reprodukovateľné
- 3D echokardiografia – podhodnocuje RVEDV,RVESV o cca 3-5%
- CCTA – nadhodnocuje objemy o cca do 10%



LEFT ENDO

NAVIGATION

- Left Endo
- Left Epi
- Right Endo

E. Diastole

E. Systole

Show Contours Outside of ED/ES

Add ED/ES for Right Ventricle

Computed Measurements

Wall Thickness

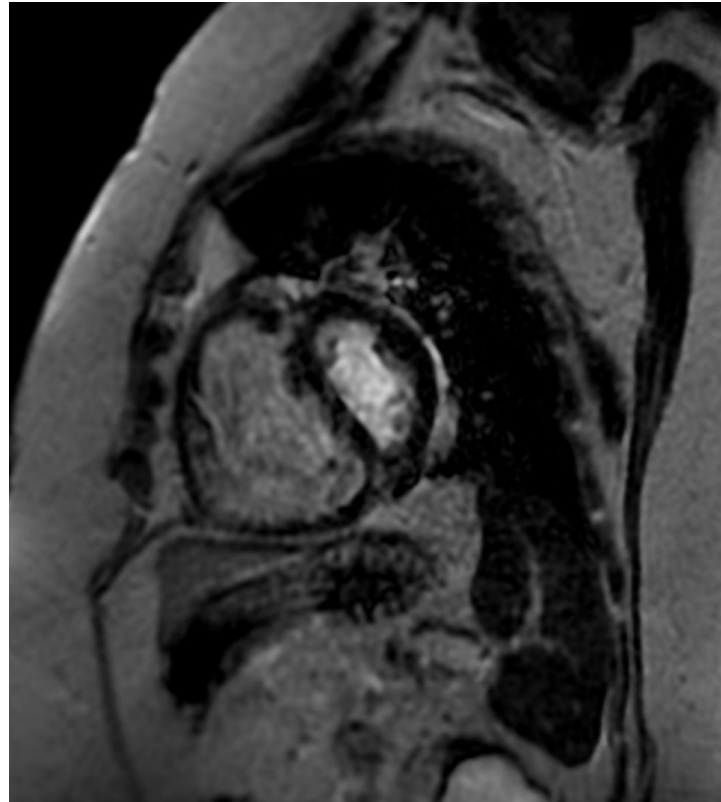
Calculation Method: Disks

Indexed Values

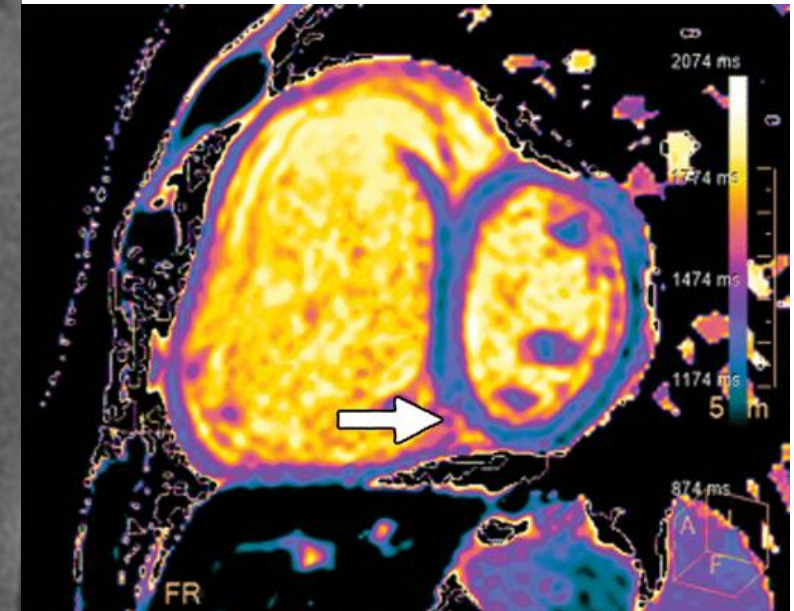
	LV	RV
SI (mL/m ²)	35.35	72.41
EF (%)	64.21	50.87
CI (L/min/m ²)	2.23	4.56
EDVI (mL/m ²)	55.06	142.34
ESVI (mL/m ²)	19.71	69.93
EDMI (g/m ²)	41.16	
ESMI (g/m ²)	30.91	
Heart Rate (bpm)		43

LGE- oneskorené postkontrastné vysycovanie PK

- prítomnosť myokardiálnej fibrózy
- mechanický stres IVS v mieste junkcie
- ↑kolagénu – myocardial disarray
- ↑hodnoty natívnych T1 máp, ECV pri fibrotickej prestavbe



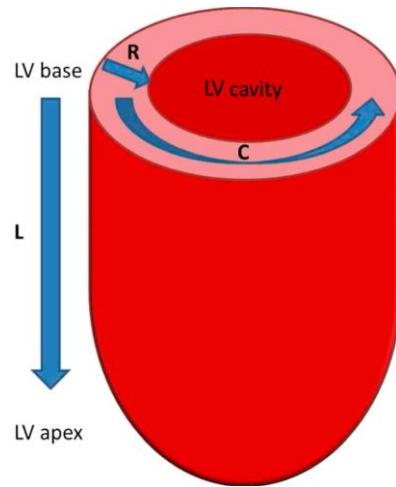
LGE – SA MDE



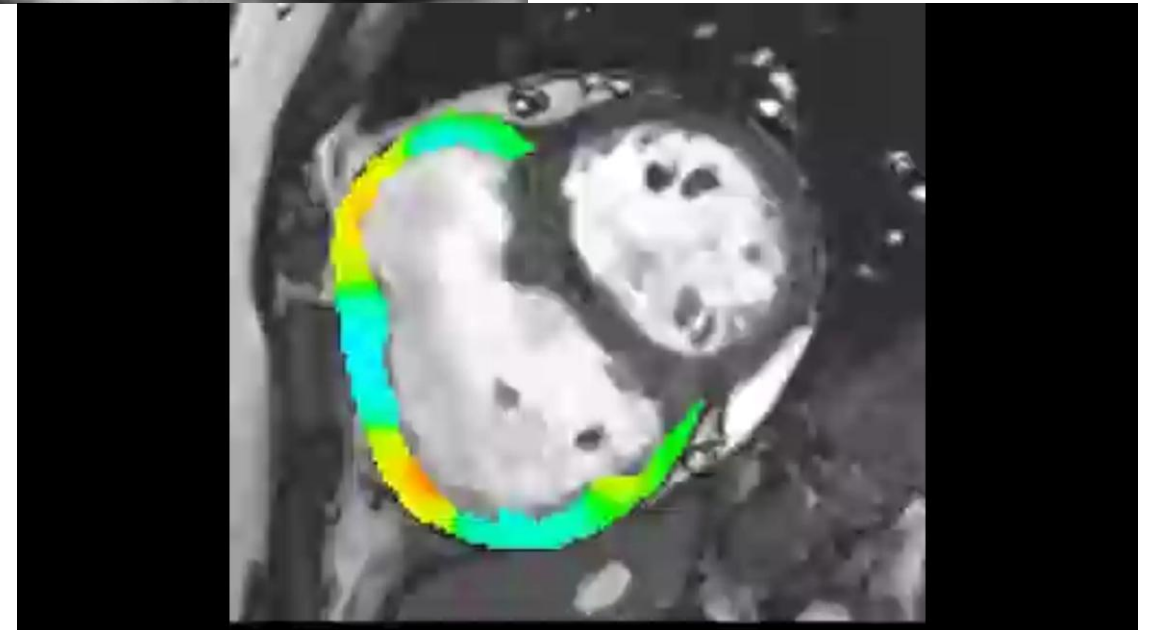
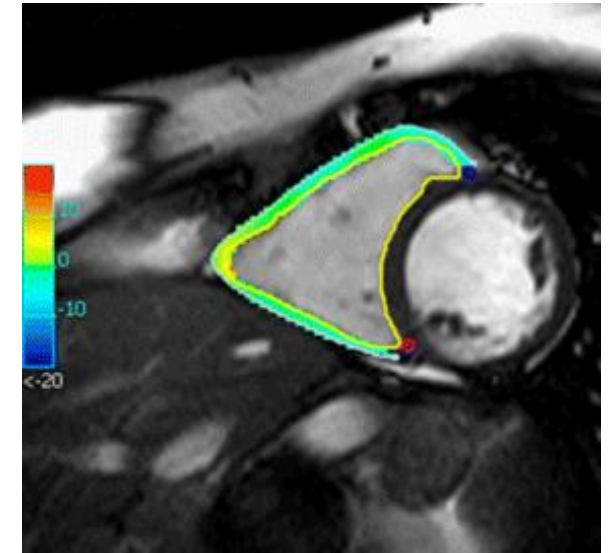
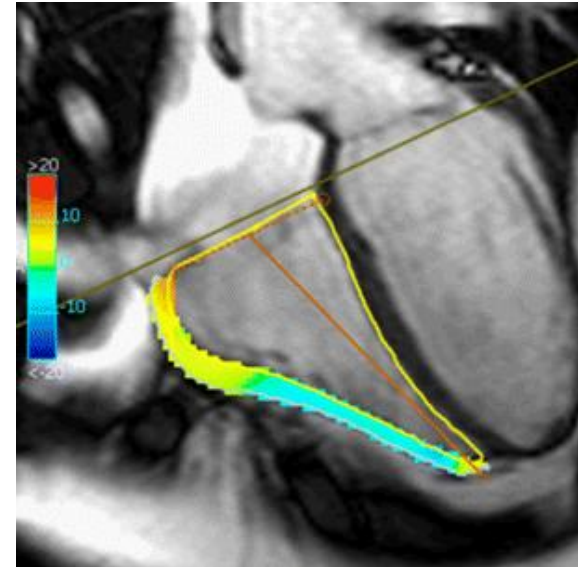
T1 mapa - SA

Myokardiálny strain

- definovaný stupňom deformácie segmentu z ich pôvodnej dĺžky
- zmeny strainu sa môžu objavovať aj pri zachovanej EF
 - longitudinálny *
 - cirkumferenciálny *
 - radiálny

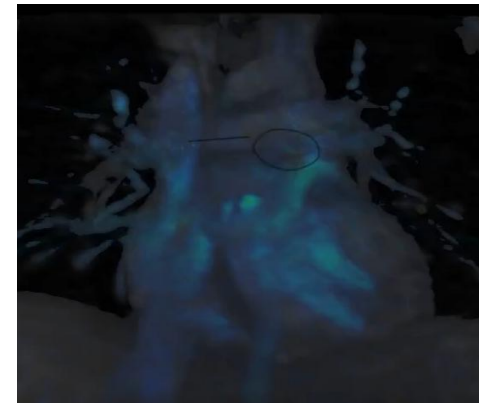


Brocano J, et al, Cardiac MRI in PH : from Magnet to bedside, Radiographics 2020, 40:982-1002

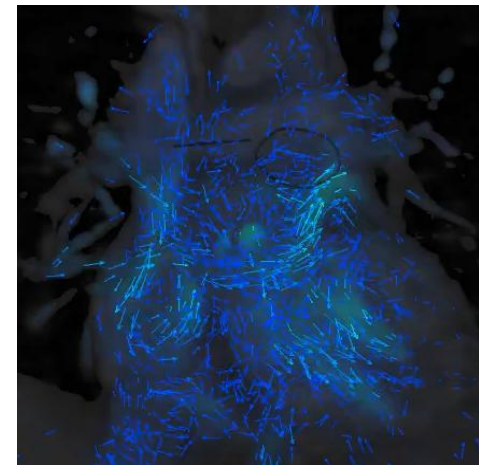


4D flow sekvencia

- prietoková analýza
- vizualizácia abnormálnych foriem prietoku
- kvantitatívna analýza dát:
 - funkcie chlopní (regurgitačná frakcia/peak velocity, gradient)
 - kvantifikácia stenózy – odhad gradientu ($\Delta P = 4v_{\max}$)
 - kvantifikácia skratov ($Q_p:Q_s$)
 - distribúcia pľúcneho prietoku ($Q_{RPA}:Q_{LPA}$)



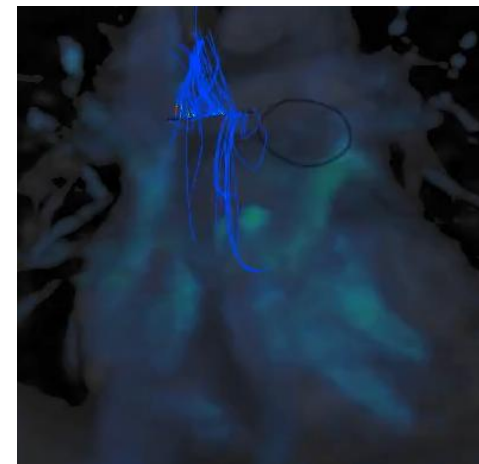
Farebne 3D
kódovaná MRA



Vektory –
rýchlosť a smer
prúdenia

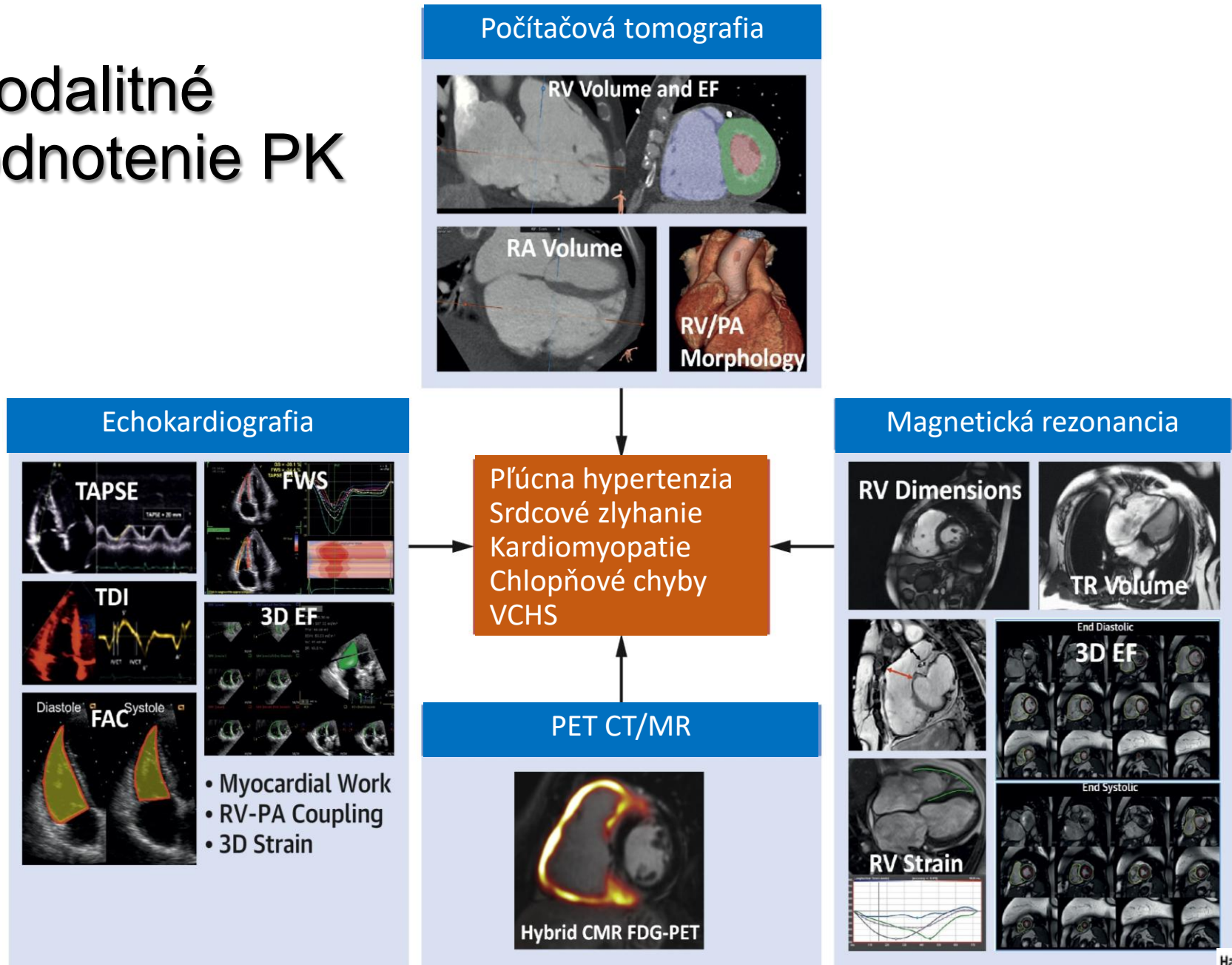


Napätie steny



Streamlines –
charakter
prúdenia

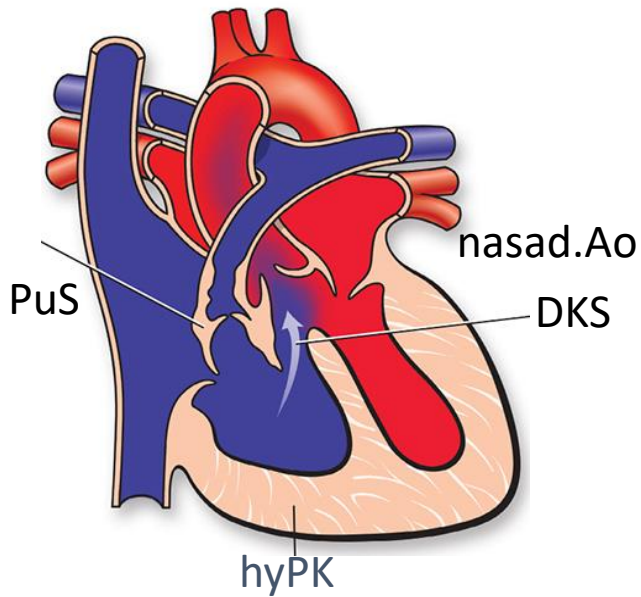
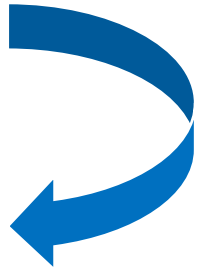
Multimodalitné hodnotenie PK



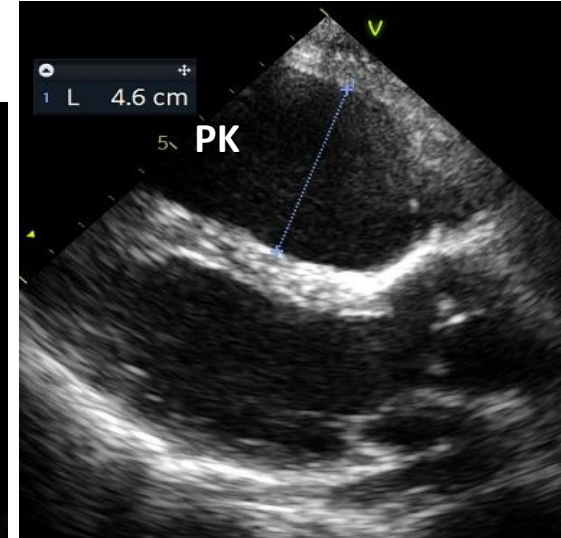
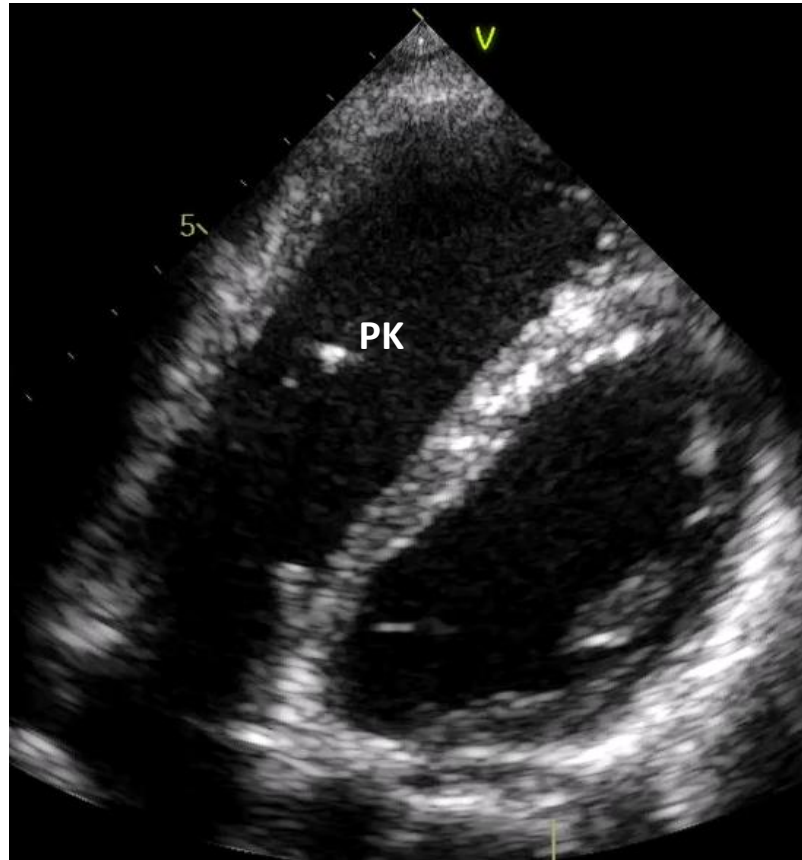
P.1

- **TOF** - 1. po spojkovej op.(Watterston. anastomóza vo veku 3 mes.), 2. po kompletnej korekcii, 3. po implantácii pulm. homograftu a anuloplastike TCh, 4. po reimplantácii homograftu a plikácii aneuryzmy RVOT

TOF PO → PuR = objemové preťaženie PK

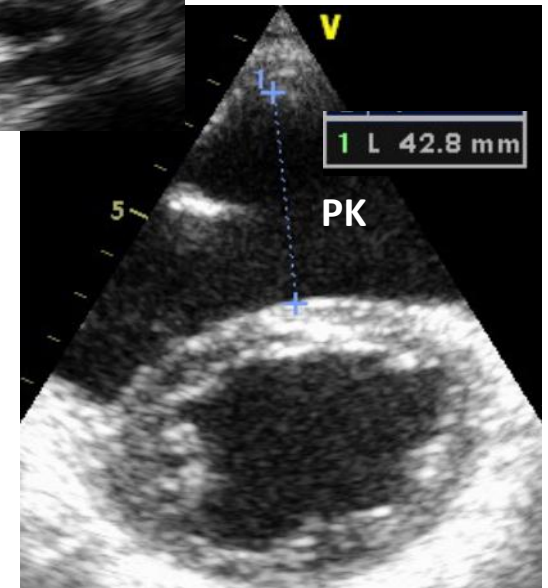


4CH



PLAx

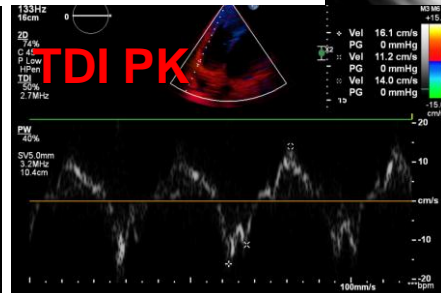
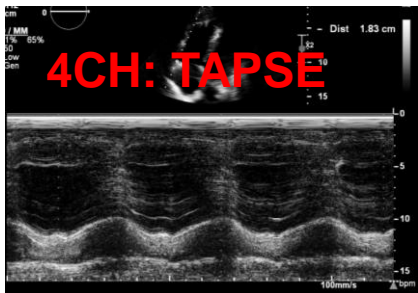
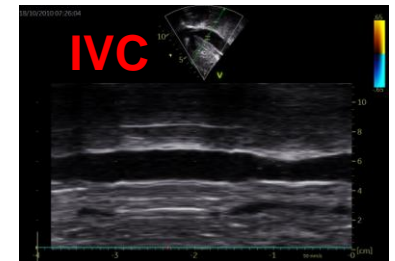
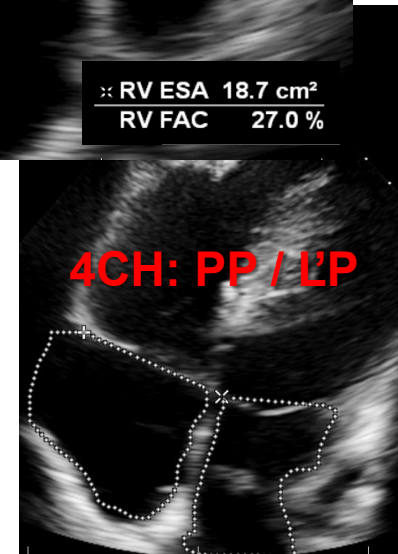
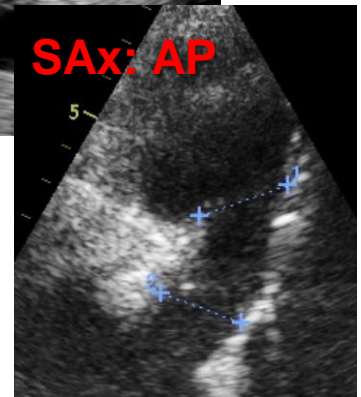
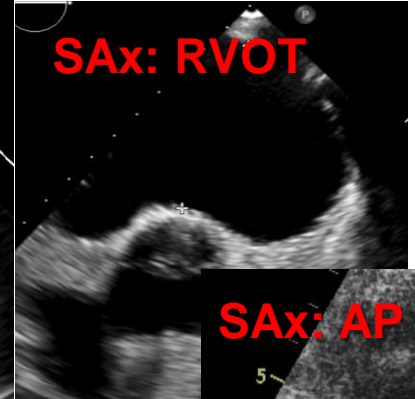
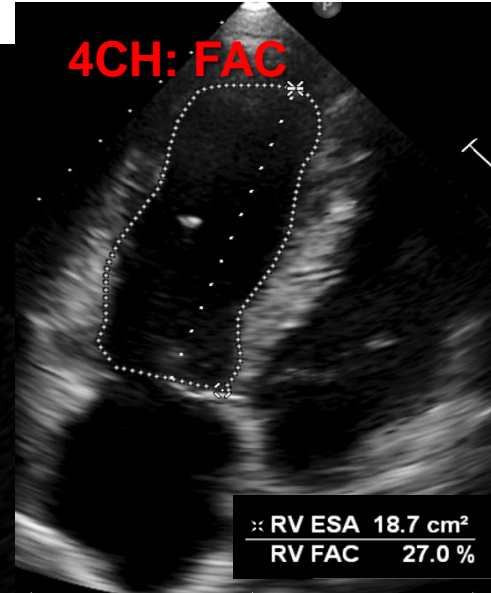
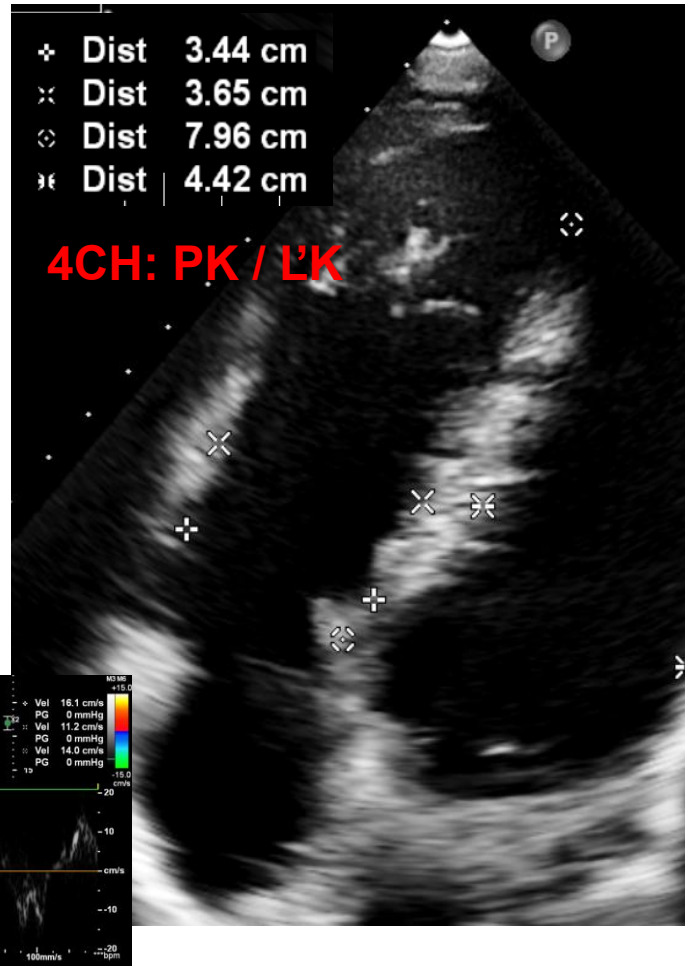
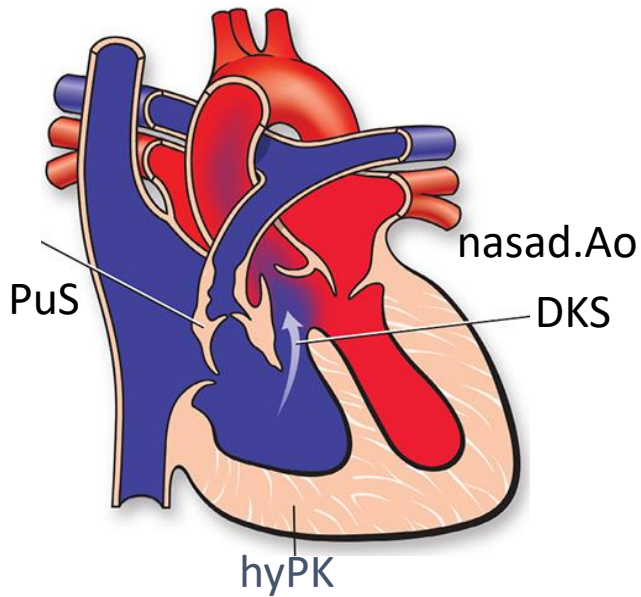
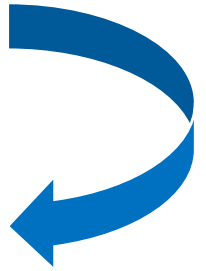
SAx



P.1

- **TOF** - 1. po spojkovej op.(Watterston. anastomóza vo veku 3 mes.), 2. po kompletnej korekcii, 3. po implantácii pulm. homograftu a anuloplastike TCh, 4. po reimplantácii homograftu a plikácii aneuryzmy RVOT

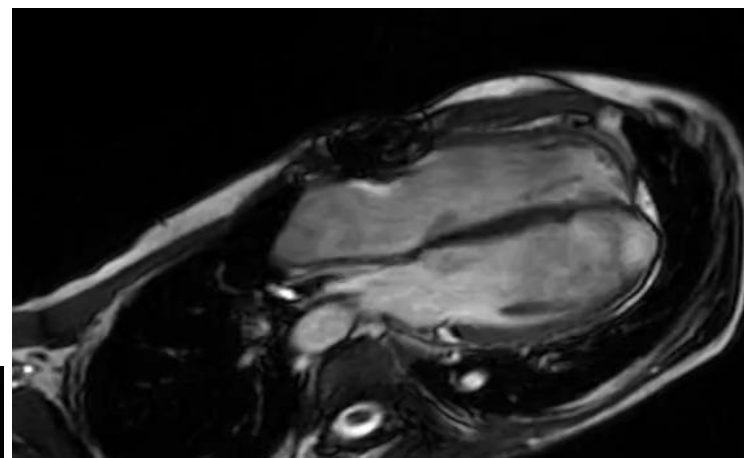
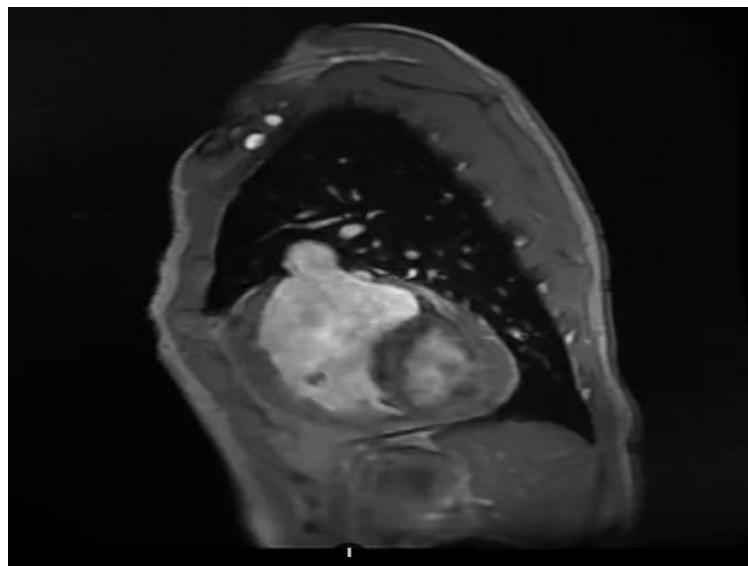
TOF PO → PuR = objemové pret'aženie PK



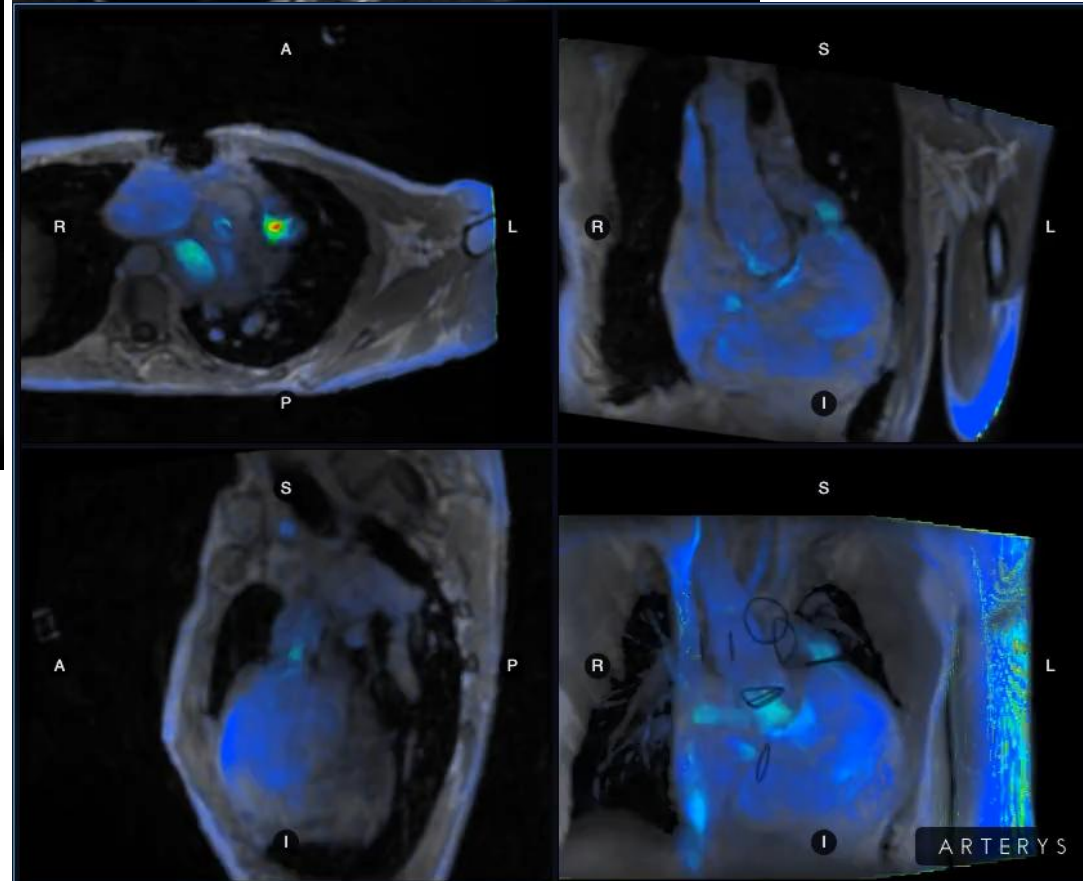
P.1 MR pred PPVI

Right Ventricle		
Flow	Index	Normal Index
317.28 mL	184.84 mL/m ²	85 ±11.7 mL/m ²
236.37 mL	137.7 mL/m ²	30 ±7.4 mL/m ²
80.92 mL	47.14 mL/m ²	55 ±8.2 mL/m ²
25.5 %	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	34 ±6.8 g/m ²
N/A	N/A	34 ±6.8 g/m ²

Forward Flow (mL/beat):	66.58
Reverse Flow (mL/beat):	-22.83
Regurgitant Fraction (%):	34.29
Peak Speed (cm/sec)	185.36
Pressure Gradient (mmHg):	14
Average Diameter (mm):	26.26
Max Diameter (mm):	26.26
WSS Peak (cPa):	182
WSS Average (cPa):	39
Primary Flow Direction:	RP



PK 38 mm
ED



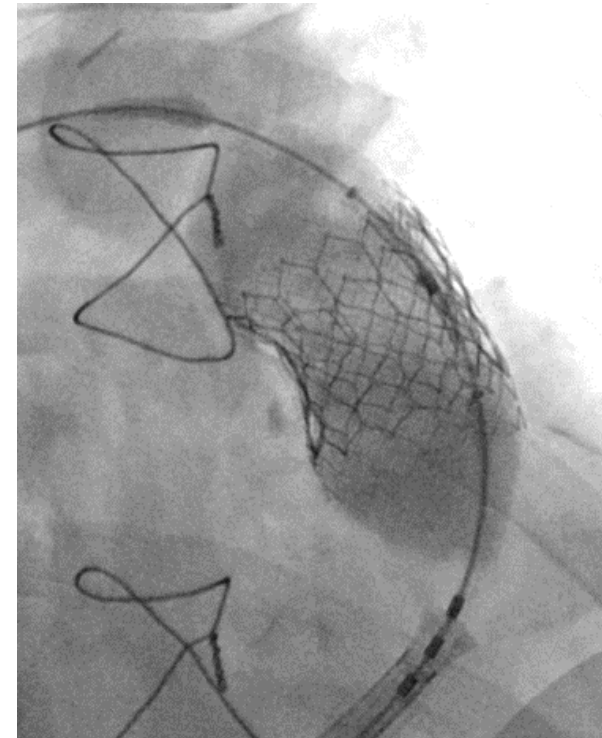
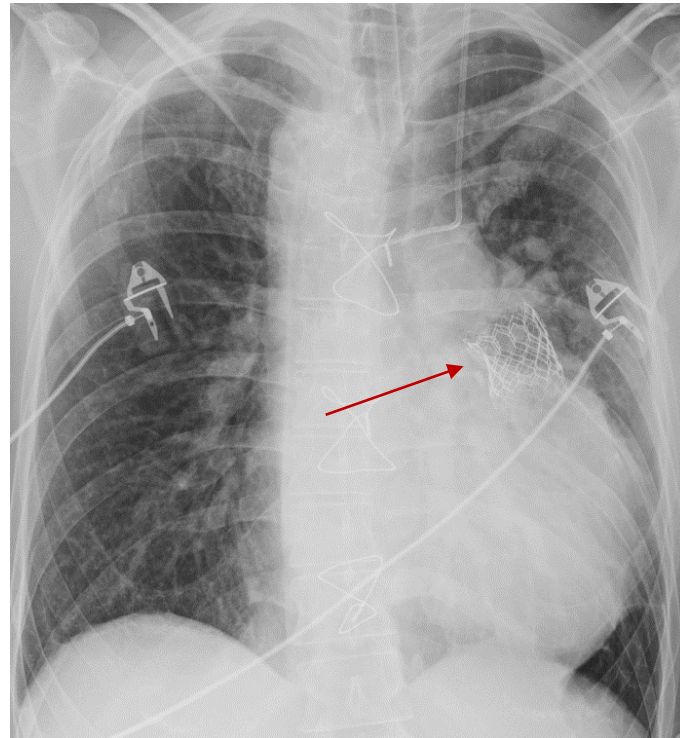
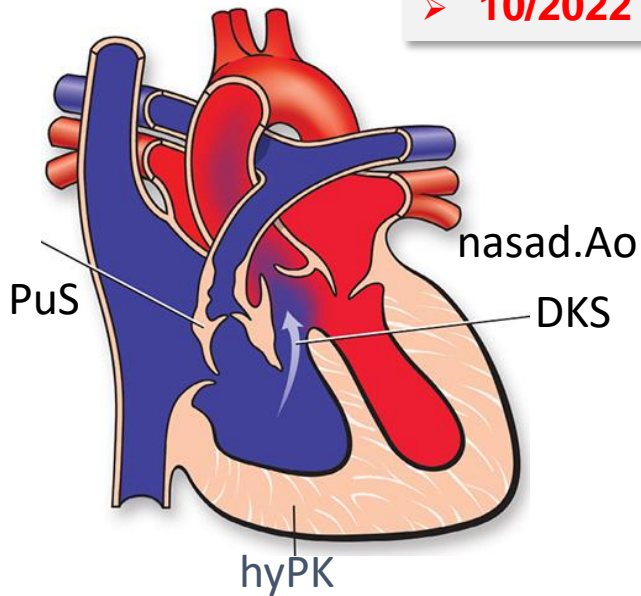
RVOT 40 mm, úroveň APV 18 mm

P.1

- **TOF** - 1. po spojkovej op.(Watterston. anastomóza vo veku 3 mes.), 2. po kompletnej korekcii, 3. po implantácii pulm. homograftu a anuloplastike TCh, 4. po reimplantácii homograftu a plikácii aneuryzmy RVOT

TOF PO → PuR = objemové preťaženie PK

- 2022 NUSCH - indikačné kritériá na reintervenciu - PK EDV/ESV 201/150ml/m², EF 26% - dľa MRI
- **10/2022 PPVI** (implantácia chlopne Edwards Sapien S3 29mm) s dobrým efektom

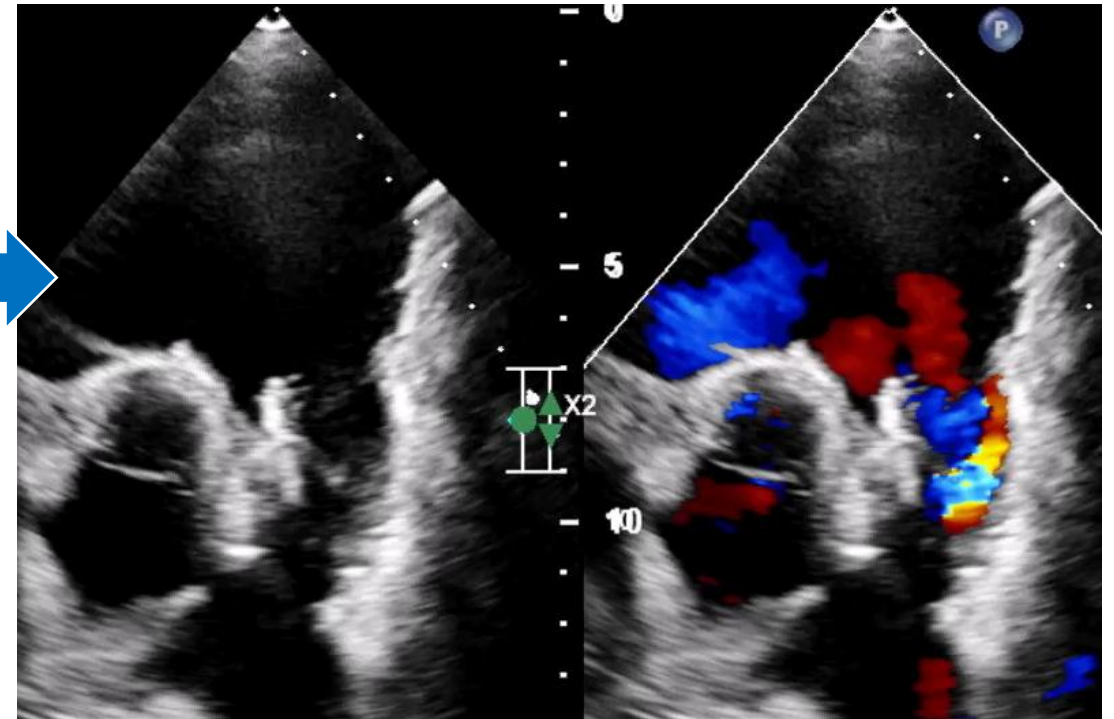
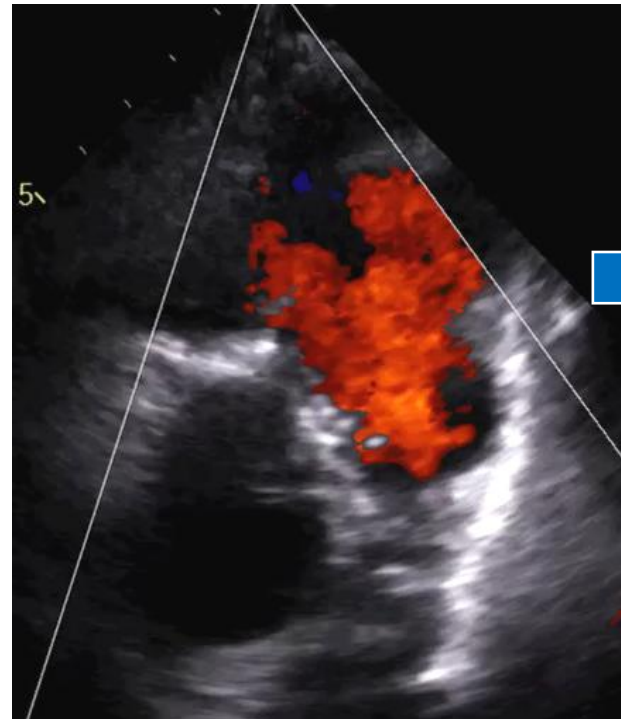
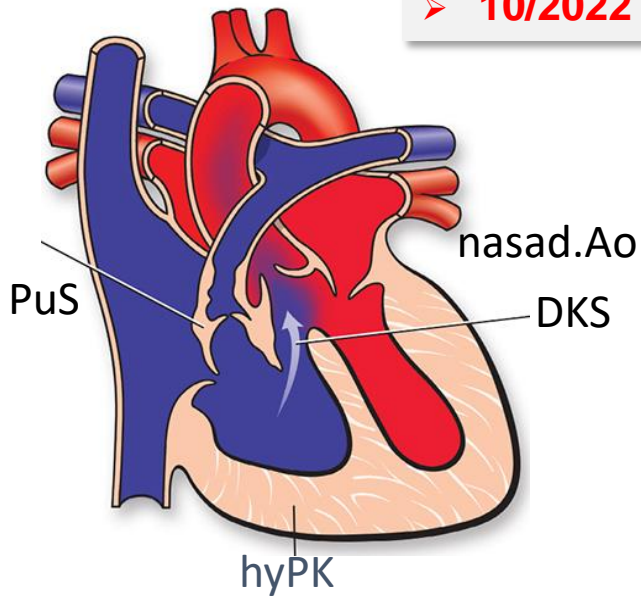


P.1

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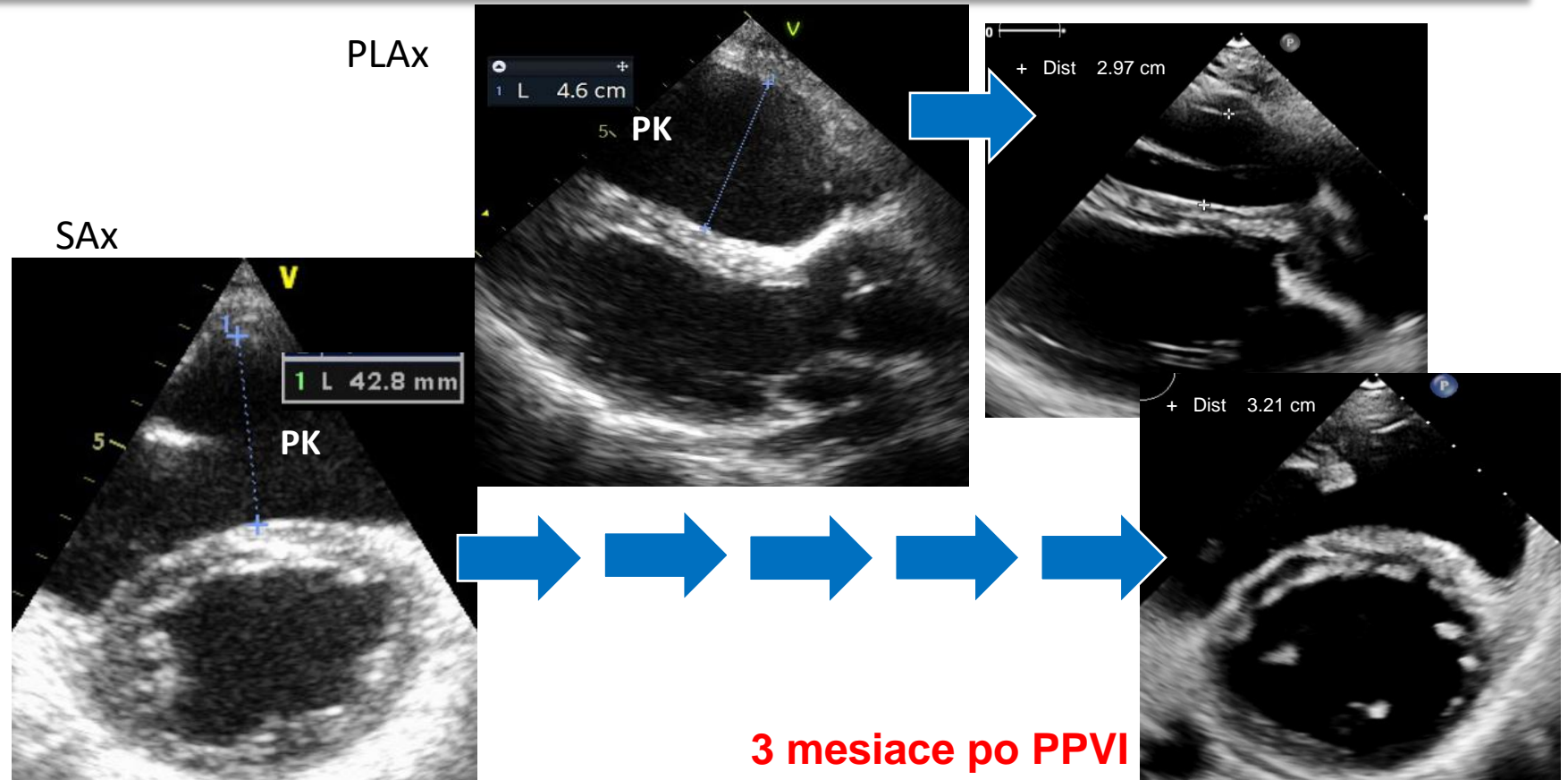
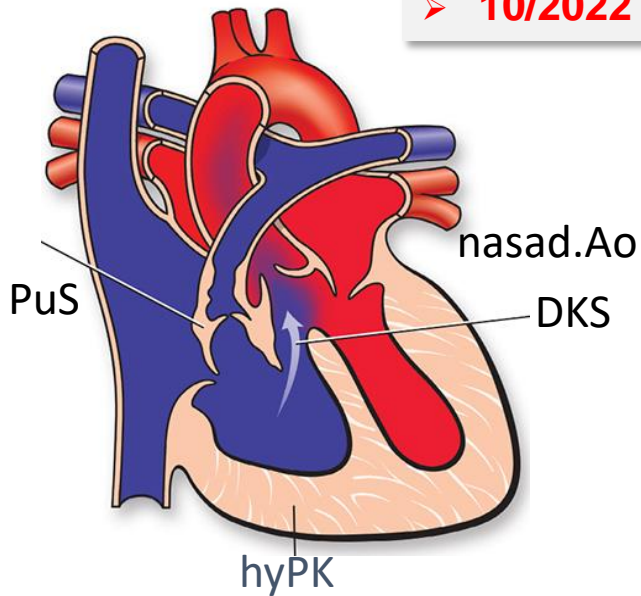


P.1

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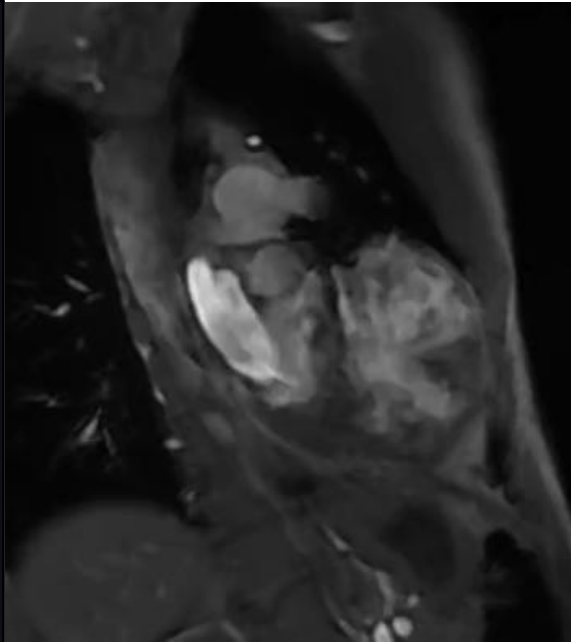


P.1

MR po PPVI

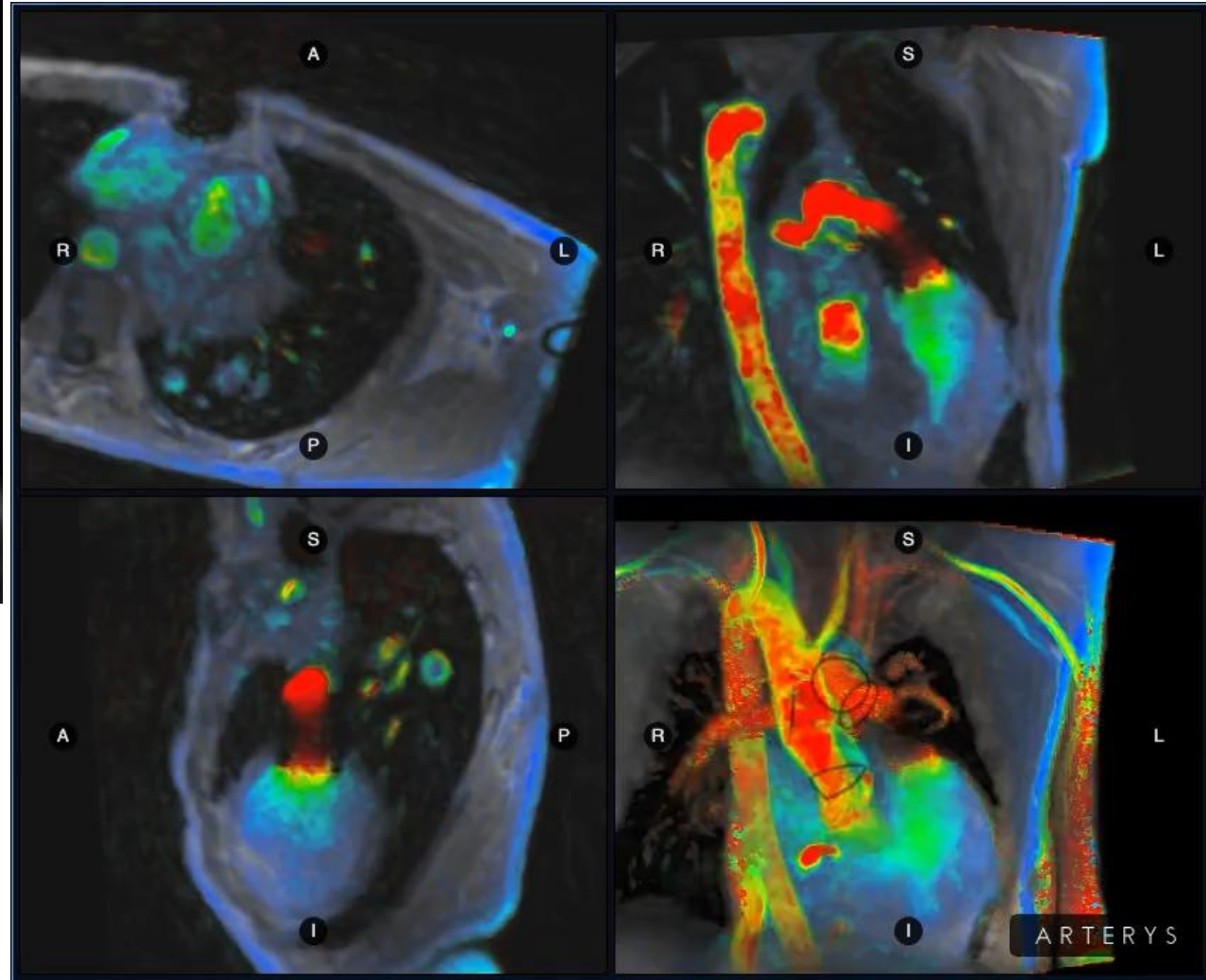
Right Ventricle

		Normal Index
87.83 mL	169.82 mL/m ²	5 ± 11.7 mL/m ²
92.23 mL	113.41 mL/m ²	0 ± 7.4 mL/m ²
95.6 mL	56.4 mL/m ²	5 ± 8.2 mL/m ²
33.21 %	N/A	N/A



N/A	N/A	N/A	
N/A	N/A	N/A	
Heart Rate:	91	I/A	N/A
Flow (L/min):	5.32	I/A	34 ± 6.8 g/m ²
Forward Flow (L/min):	5.63	I/A	34 ± 6.8 g/m ²
Reverse Flow (L/min):	-0.31	I/A	
Flow (mL/beat):	58.48		
Forward Flow (mL/beat):	61.84		
Reverse Flow (mL/beat):	-3.36		
Regurgitant Fraction (%):	5.43		
Peak Speed (cm/sec)	167.77		
Pressure Gradient (mmHg):	11		
Average Diameter (mm):	27.53		
Max Diameter (mm):	27.53		
WSS Peak (cPa):	164		
WSS Average (cPa):	26		
Primary Flow Direction:	RPS		

PI stopa, RF 5%

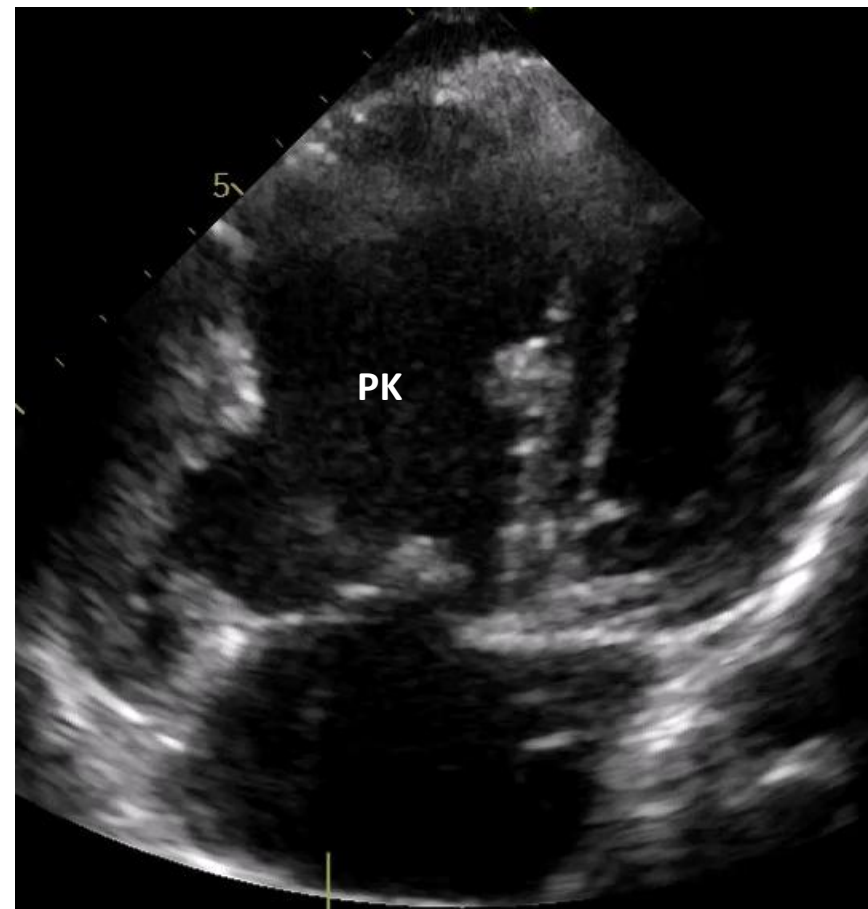
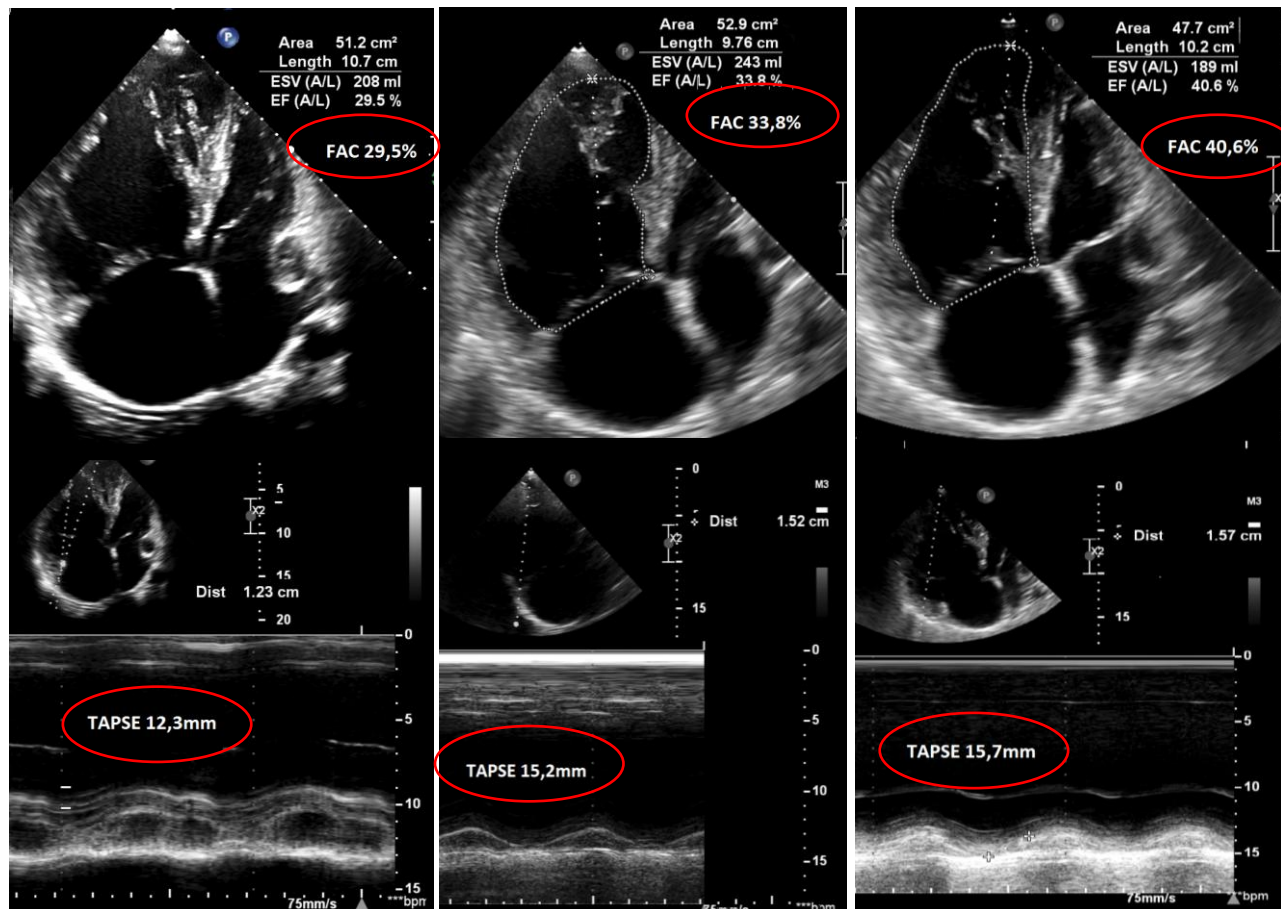
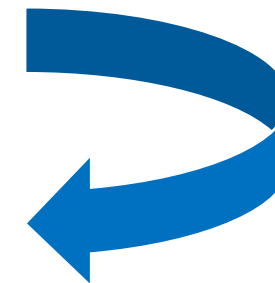


ARTERYS

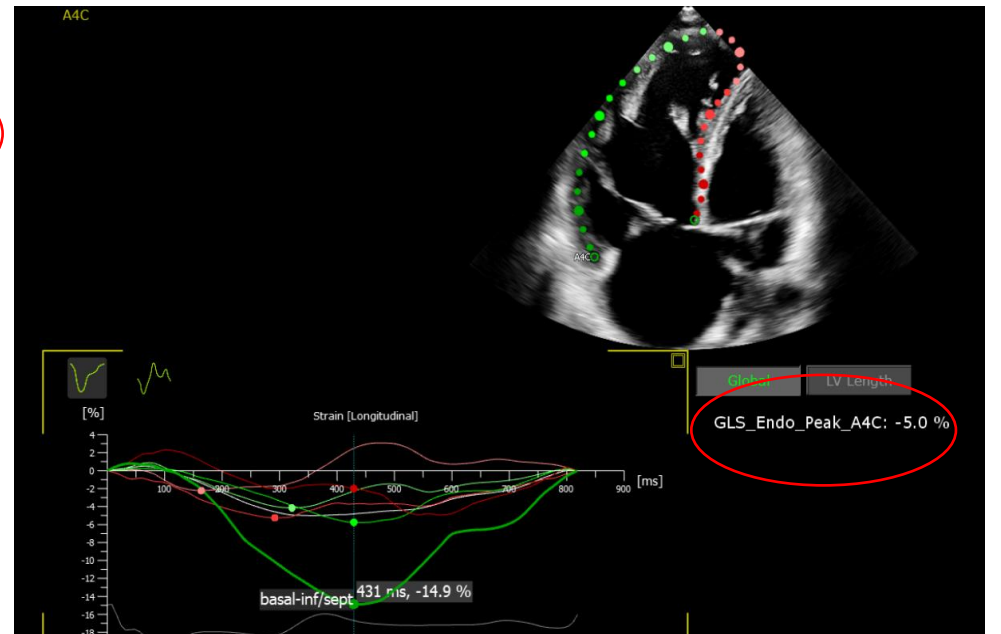
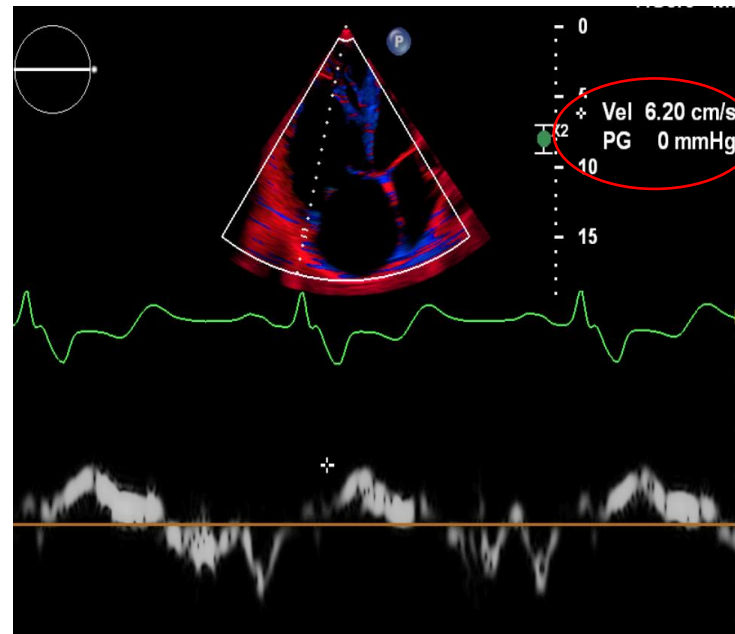
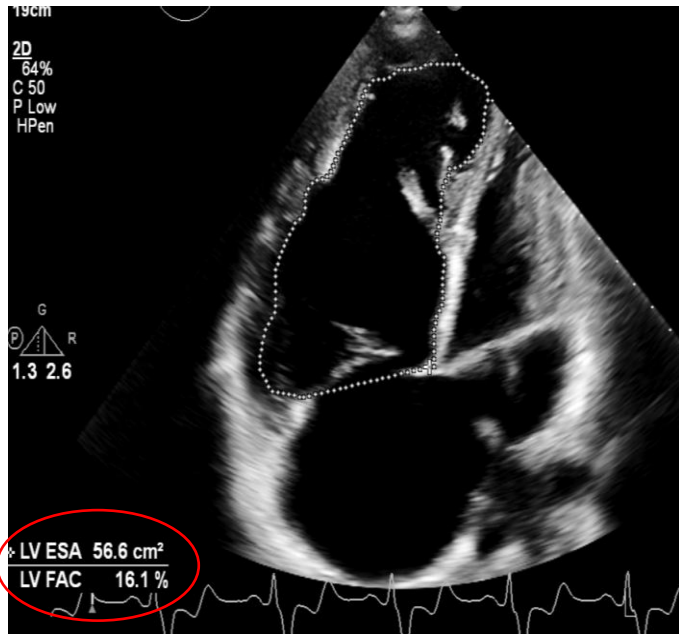
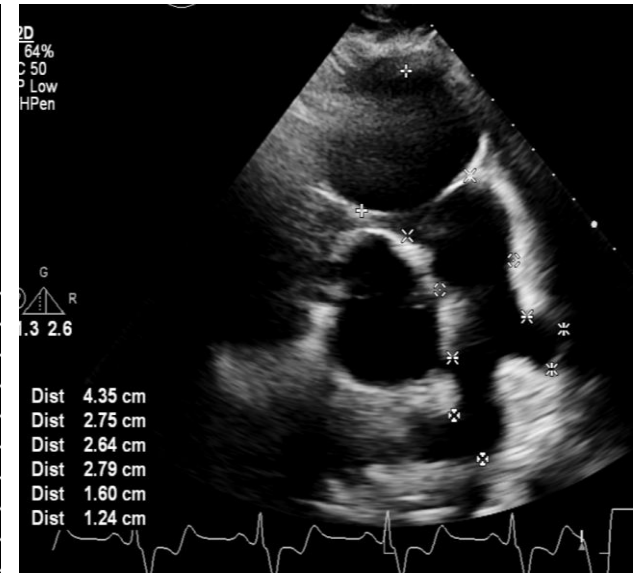
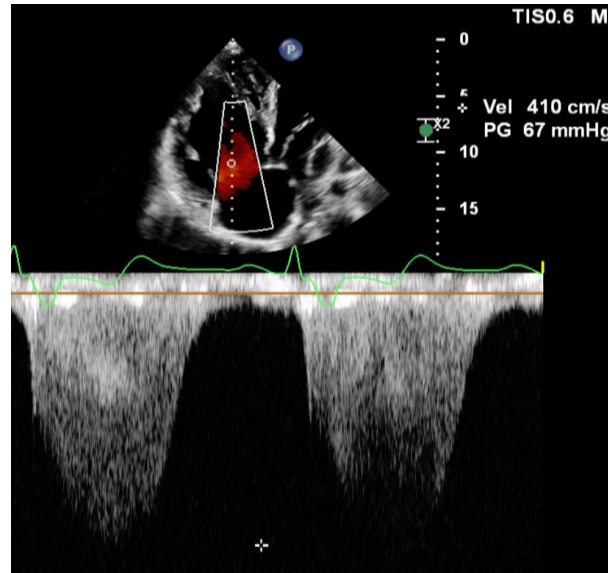
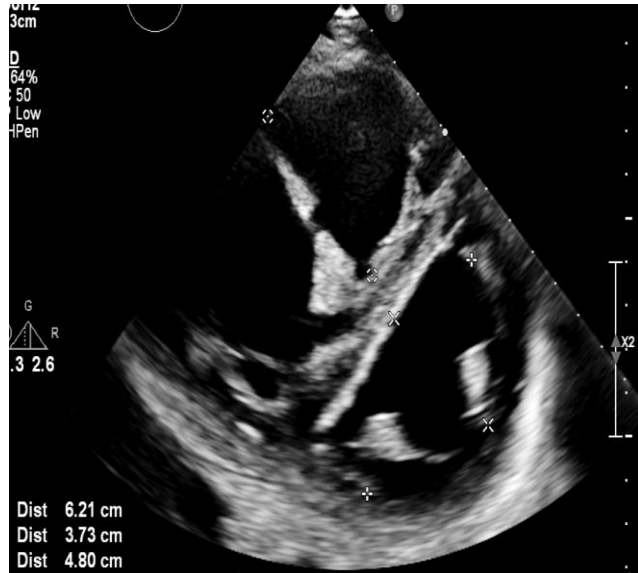
P.2

- **TOF** – 1997 OP - ale perioperačne aj aorto-pulmonálne okno; „kompletnej korekcia“ aj s uzáverom APW“, vzhľadom na PAH - fenester na IAS.
- Od operácie - **závažná PAH**
- Od 2010 špecif. Th. PAH → bosentan, 2017 bosentan + sildenafil, 2019 selexipag + macitentan + sildenafil / 2022 tadalafil

TOF + APW PO → PAH = tlakové preťaženie PK



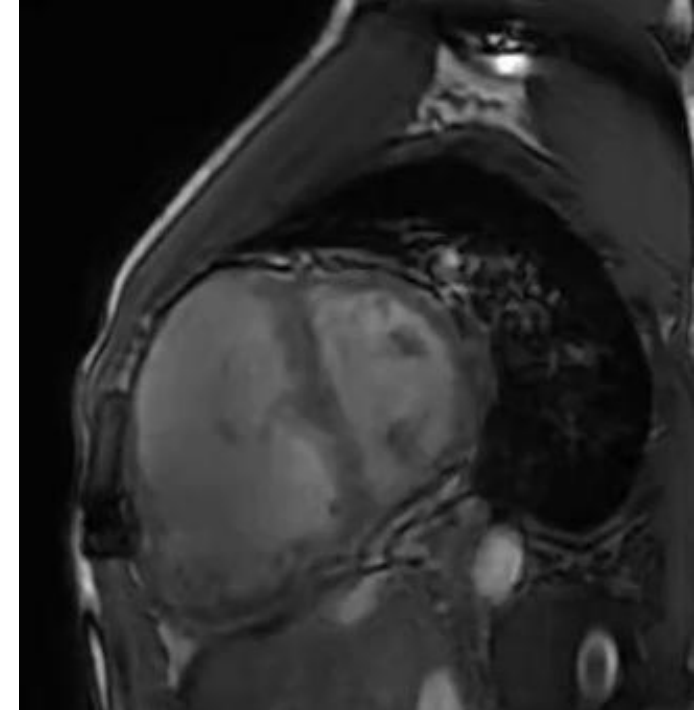
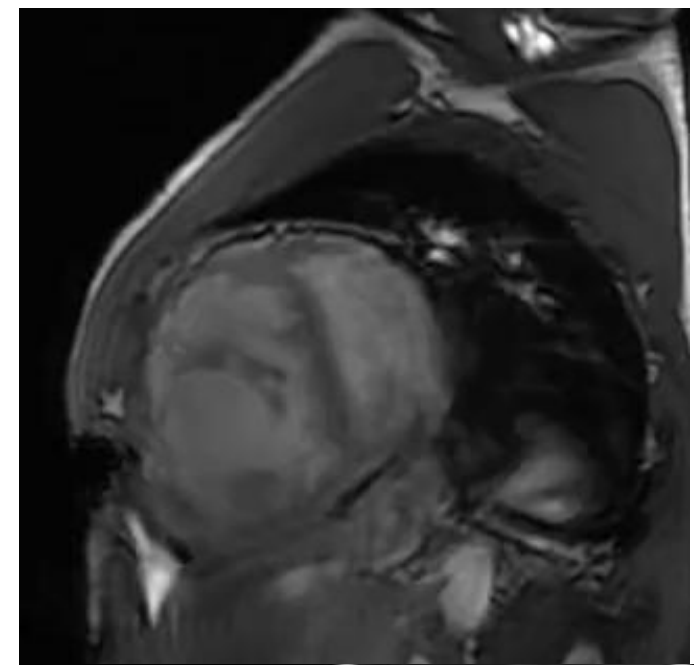
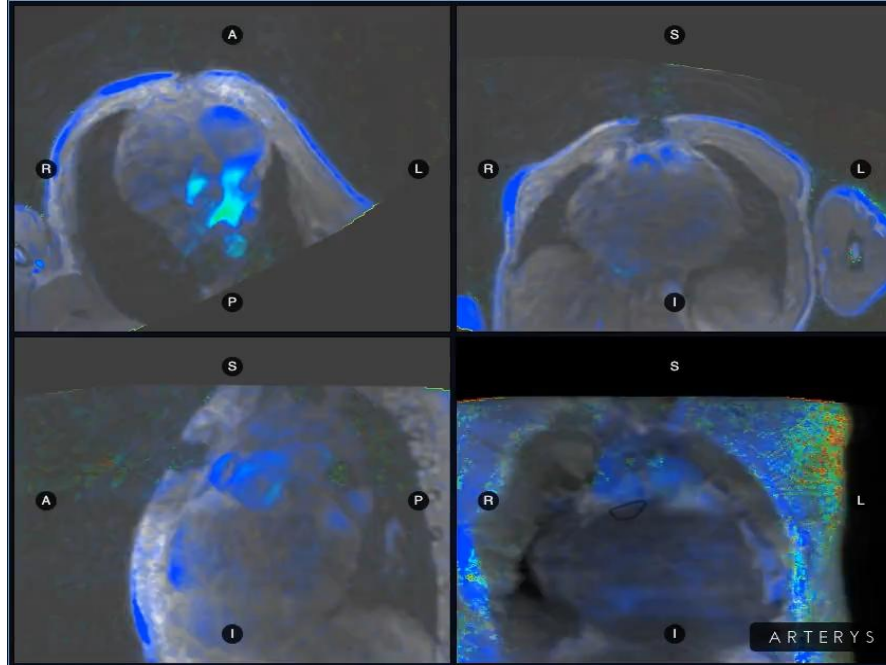
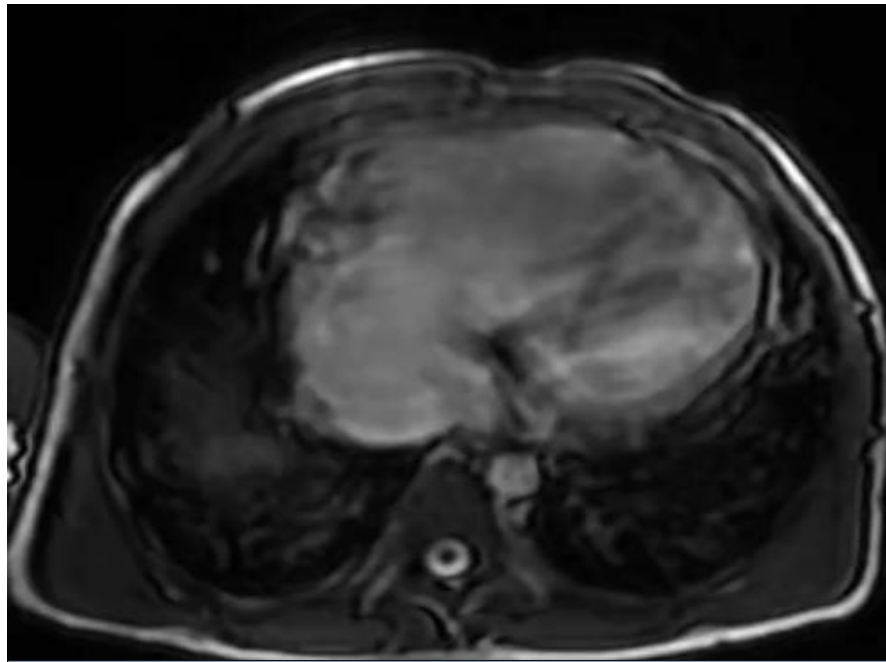
P.2



P.2

MR

- limitácia pri výraznej tachykardii (158/min)
- dychové artefakty
- EF, prietoky nekvantifikovateľné

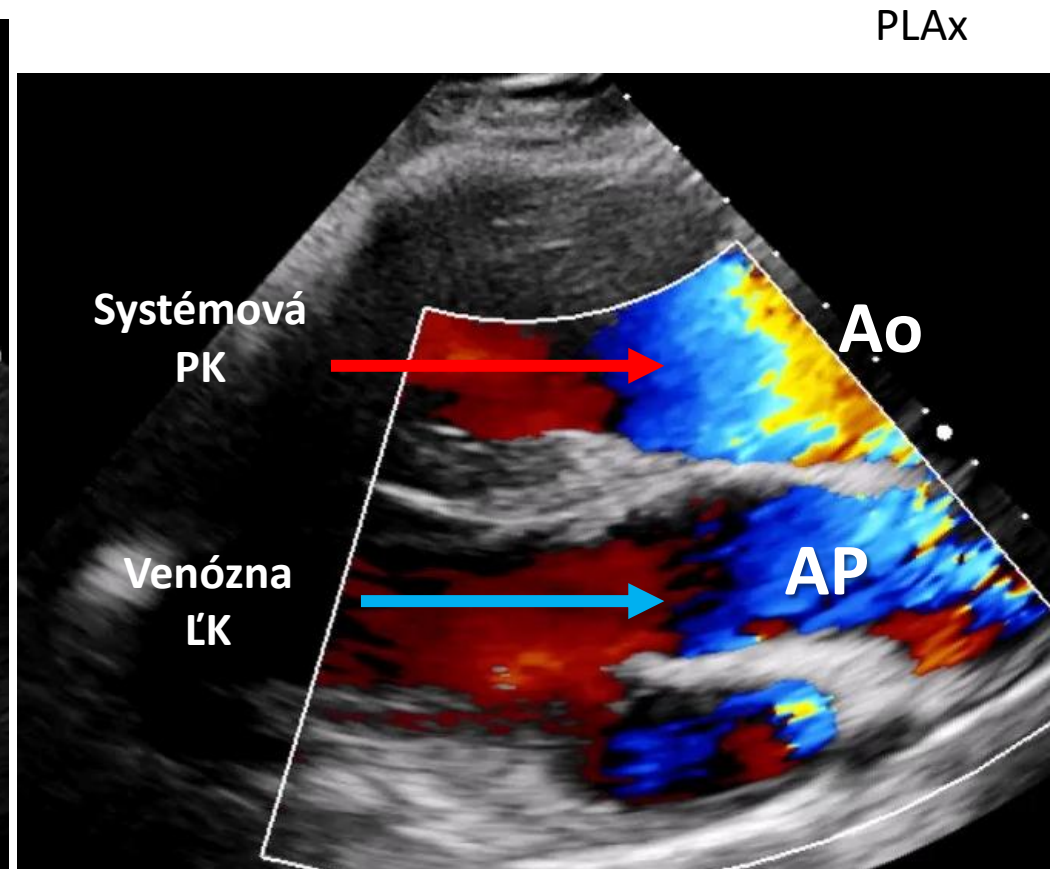
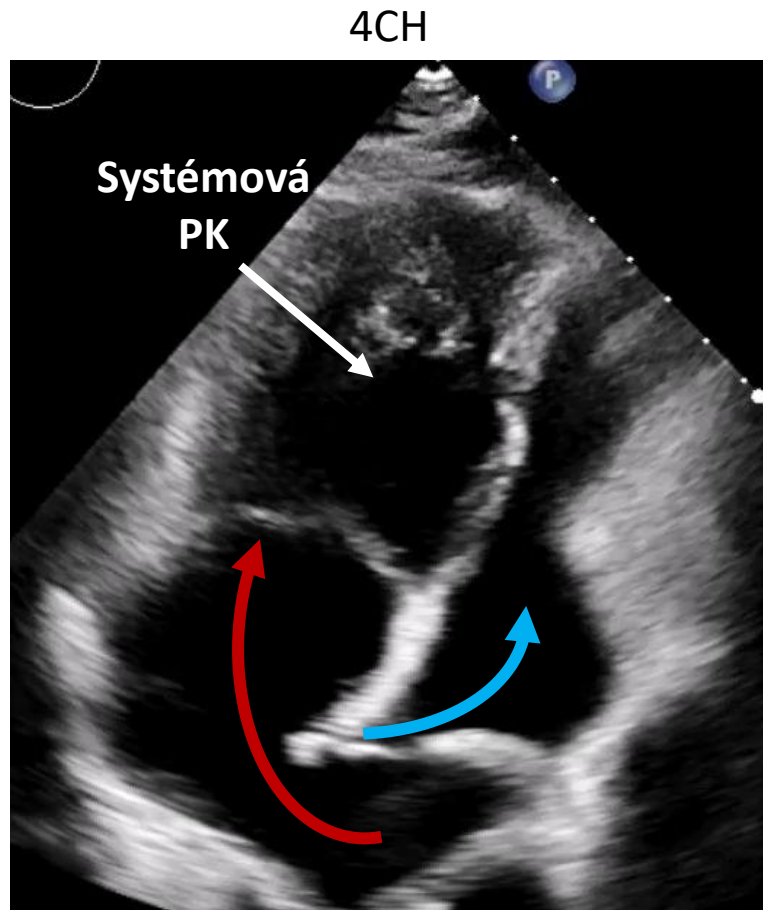
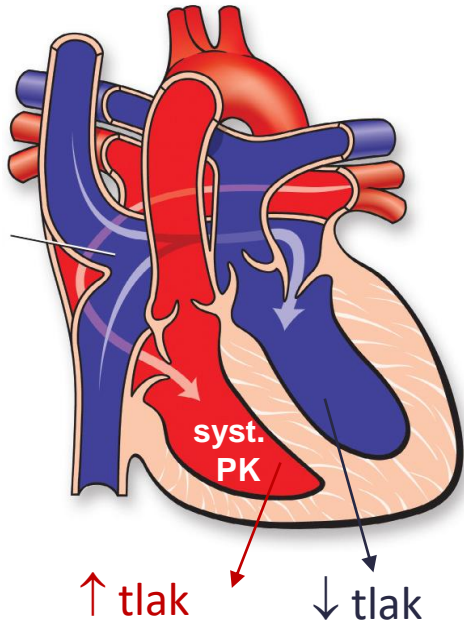


P.3

➤ **D-TGA** po Mustardovej OP (atriálna korekcia 3/1984)



Atriálna korekcia D-TGA = systémová PK

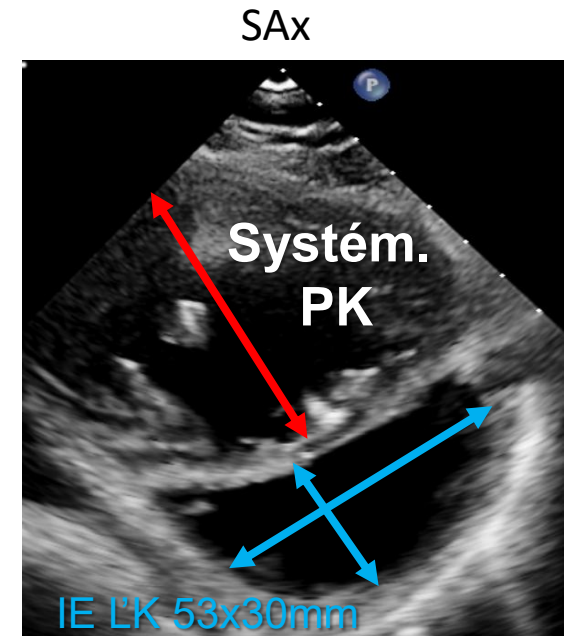
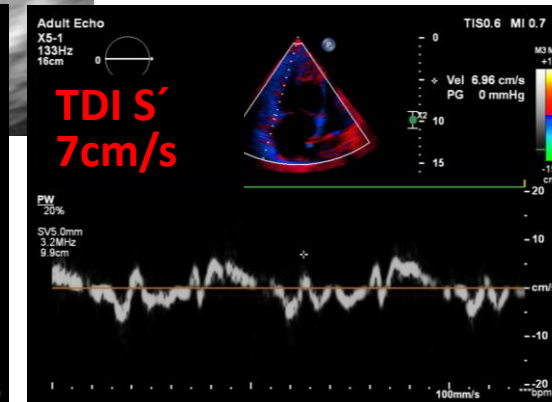
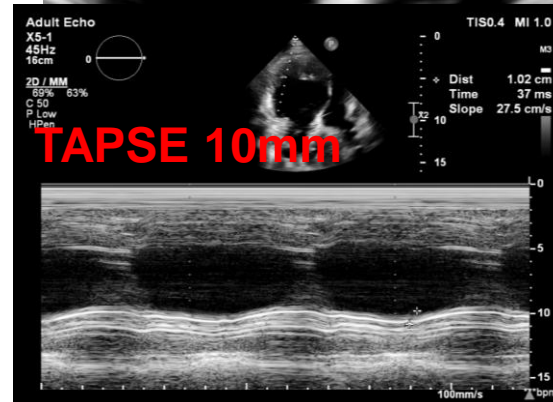
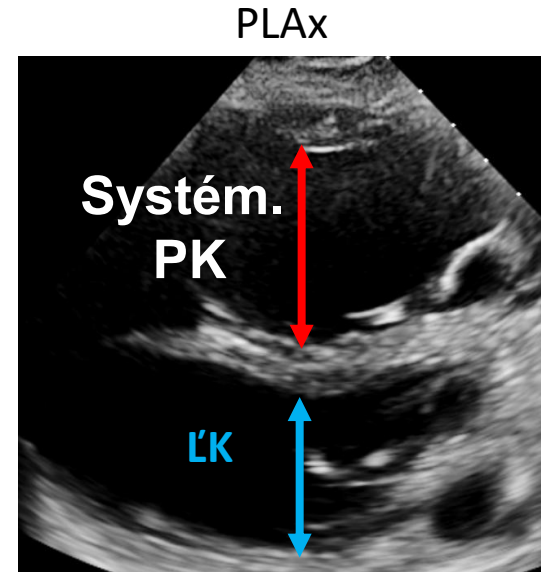
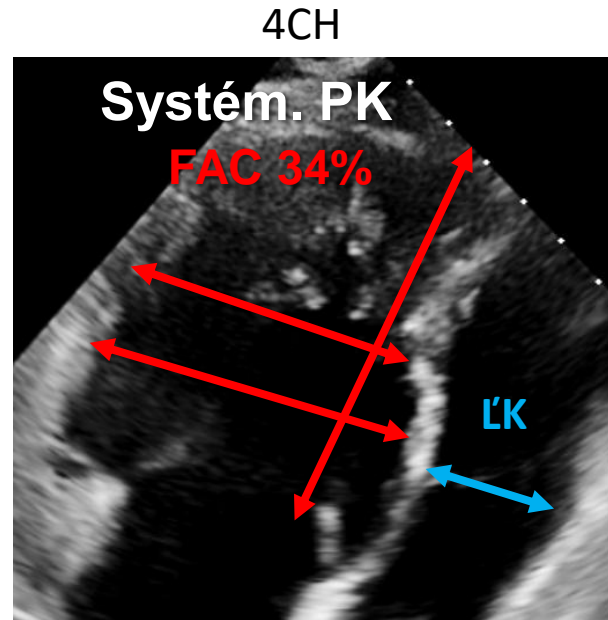
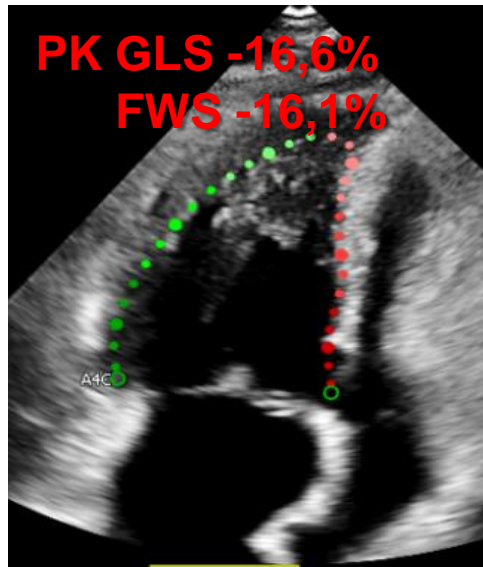
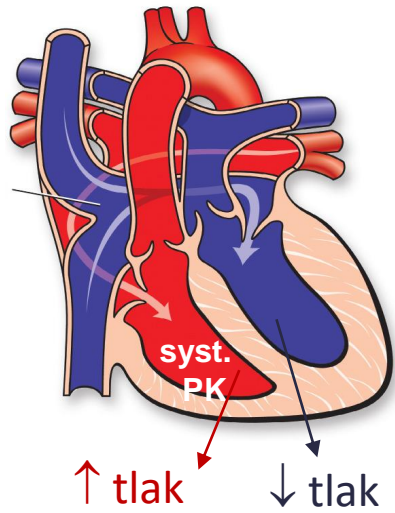


P.3

➤ **D-TGA** po Mustardovej OP (atriálna korekcia 3/1984)



Atriálna korekcia D-TGA = systémová PK



P.3

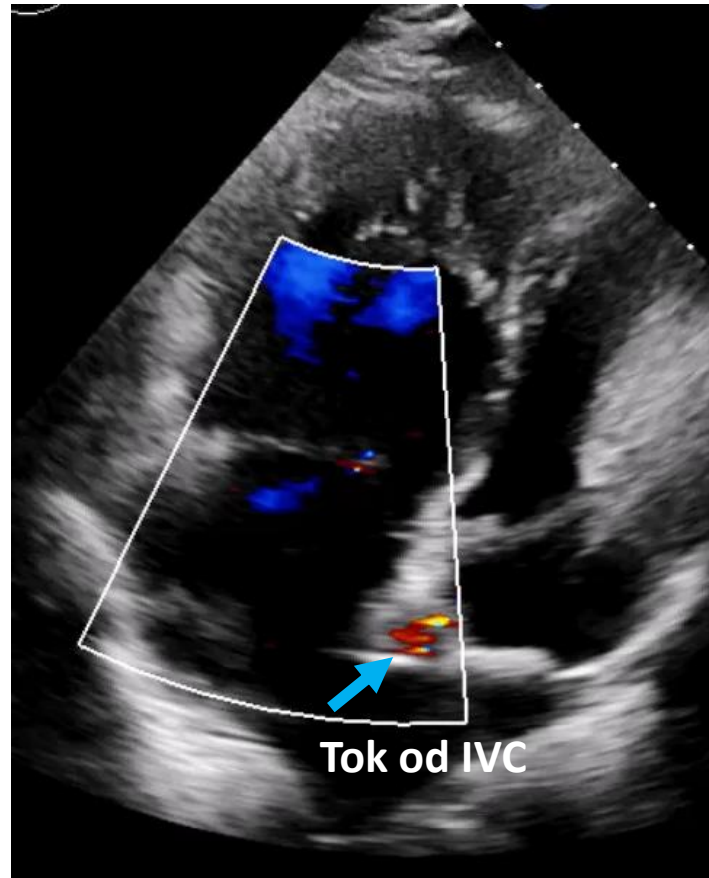
➤ **D-TGA** po Mustardovej OP (atriálna korekcia 3/1984)

➤ **1/2023 recid. hemoptýzy**

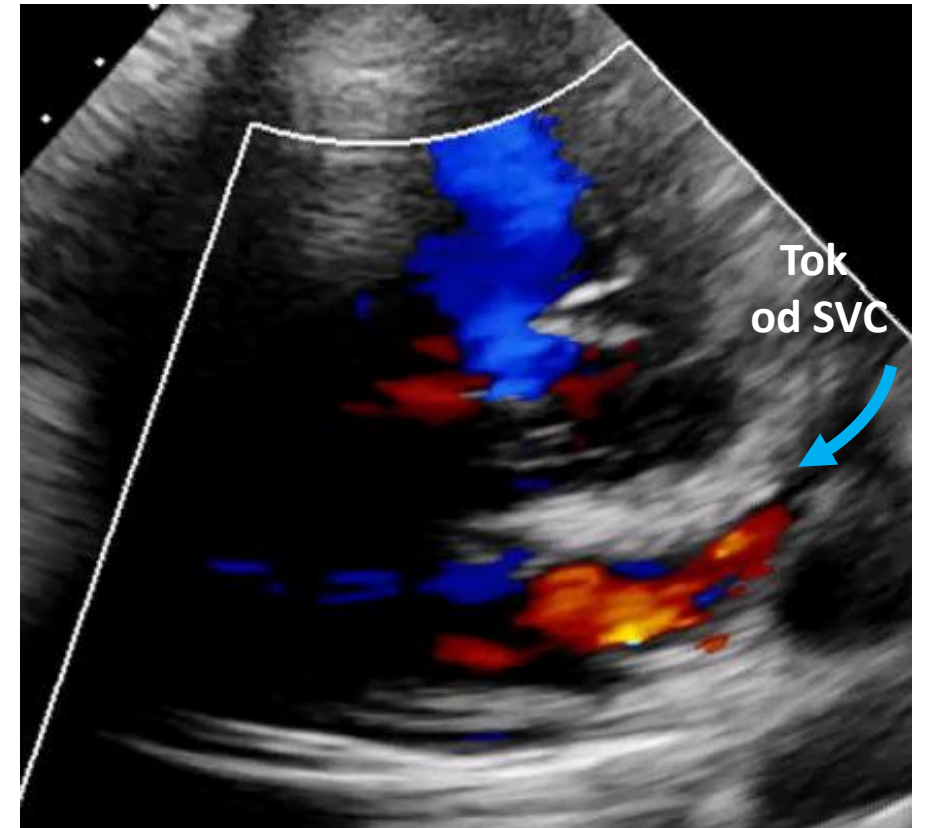
Atriálna korekcia D-TGA = systémová PK



4CH



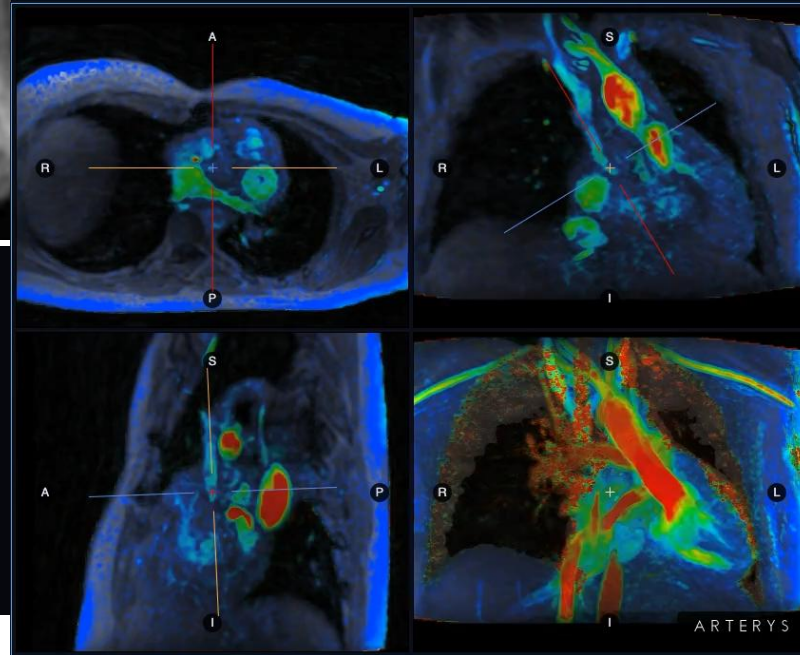
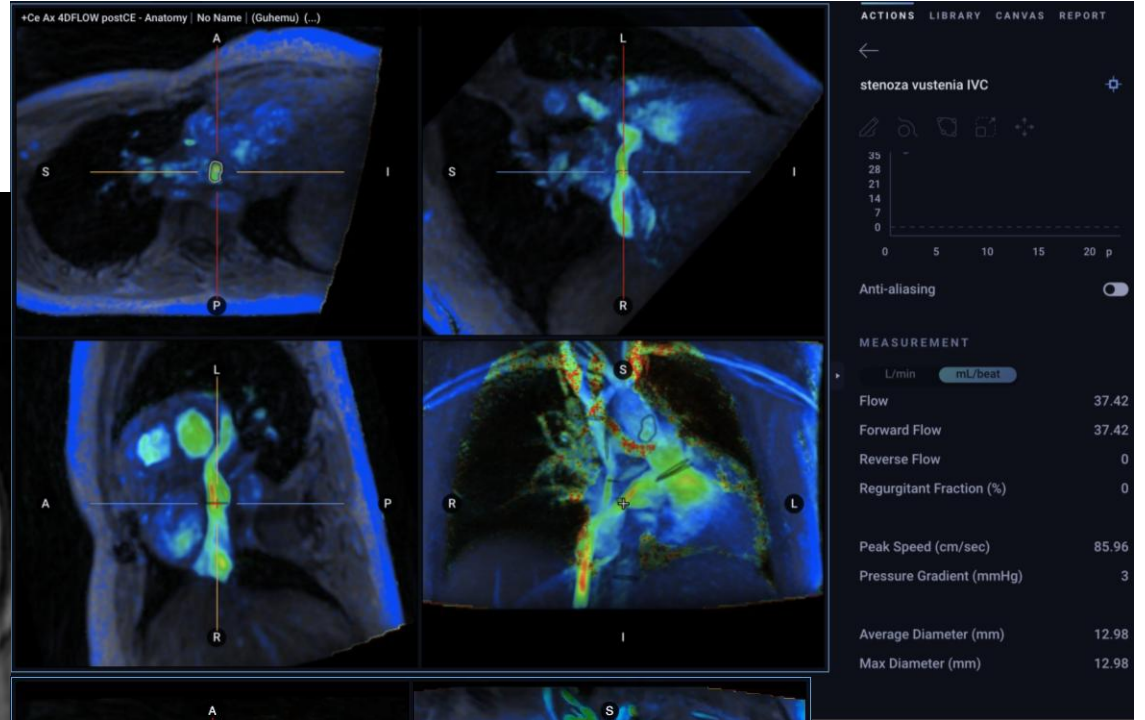
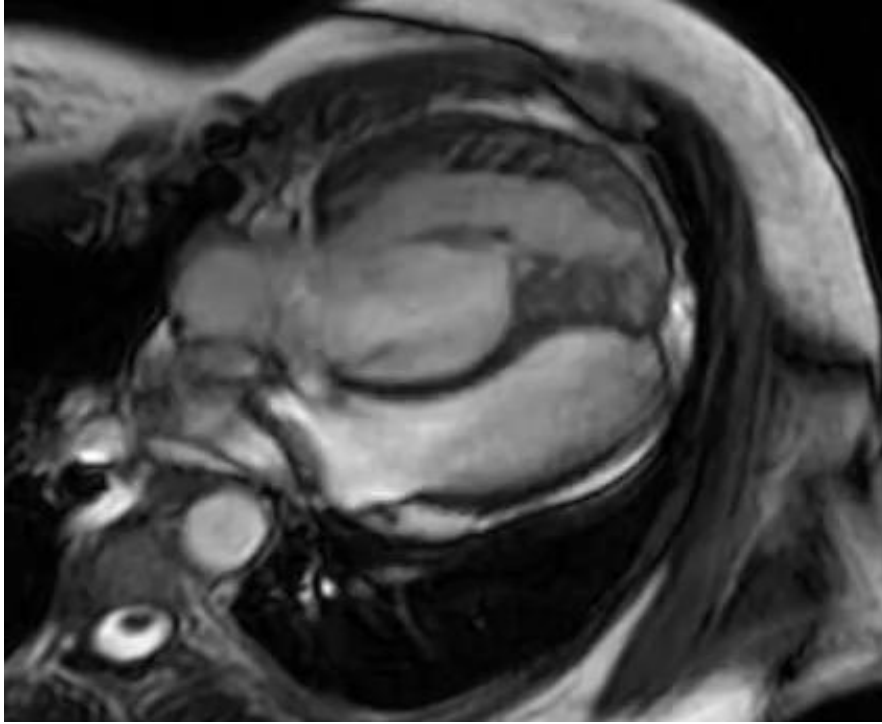
PLAx



P.3

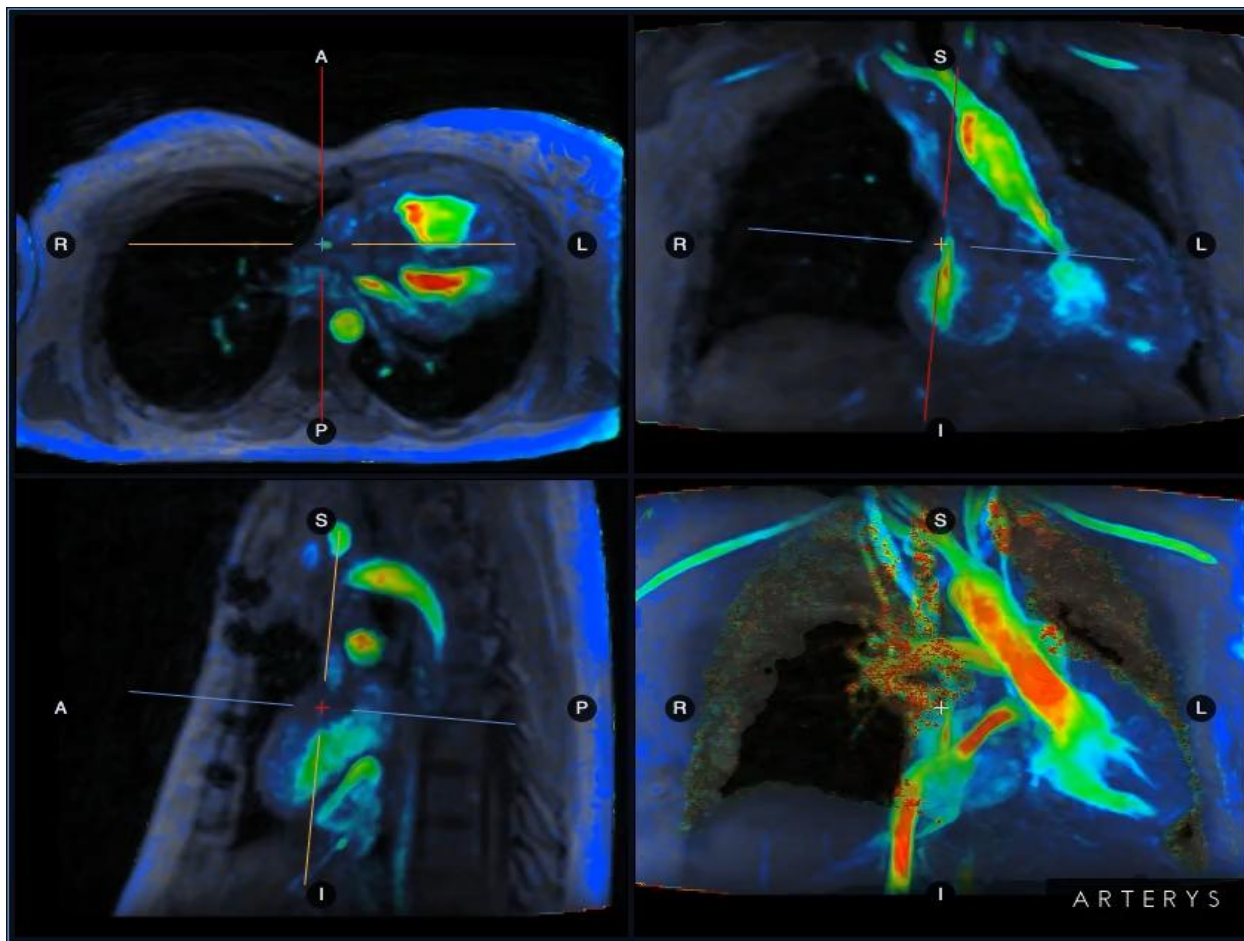
MR

PK systémová
ĽK subpulmonálna

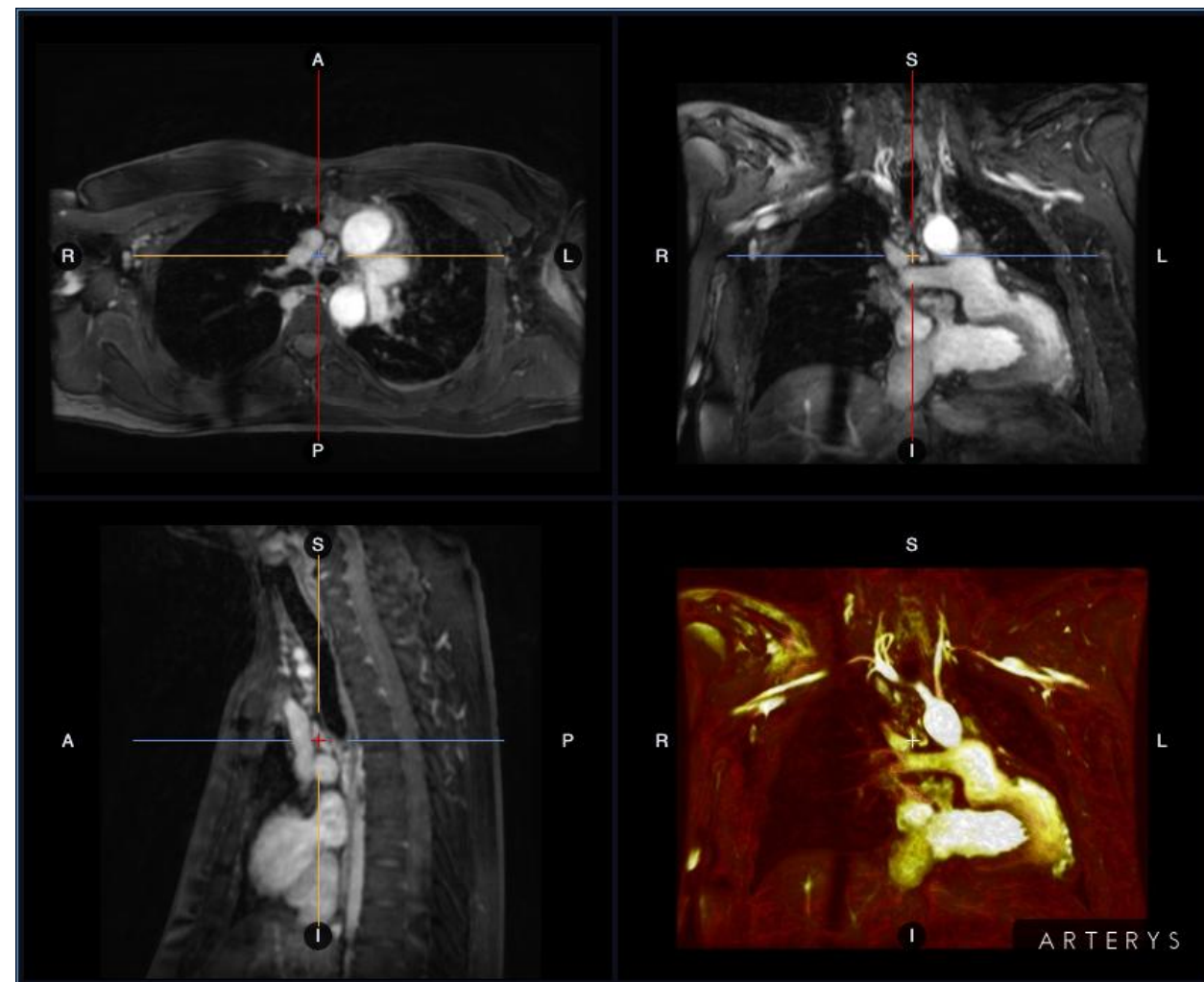


Stenóza VCS
k VCI s minm.
prietokom

Metric	Raw	Left Ventricle		Right Ventricle		
		Index	Normal Index	Raw	Index	Normal Index
ED Volume	107.29 mL	58.49 mL/m ²	79 ±8.7 mL/m ²	225.56 mL	122.96 mL/m ²	80 ±9.4 mL/m
ES Volume	45.14 mL	24.61 mL/m ²	27 ±4.7 mL/m ²	116.83 mL	63.69 mL/m ²	30 ±6.6 mL/m
Stroke Volume	62.15 mL	33.88 mL/m ²	52 ±6.2 mL/m ²	108.73 mL	59.27 mL/m ²	50 ±6.1 mL/m
Ejection Fraction	57.92 %	N/A	N/A	48.2 %	N/A	N/A
Cardiac Output	2.86 L/min	1.56 L/min/m ²	3.3 ±0.5 L/min/m ²	5 L/min	2.73 L/min/m ²	N/A



P-L skrat medzi VCS a predsieňou (PV), Q_p/Q_s 0,6

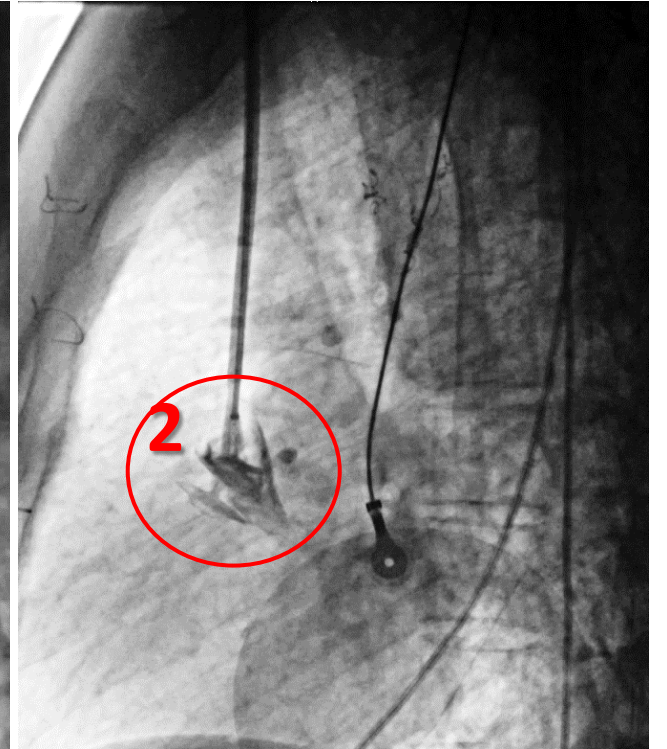
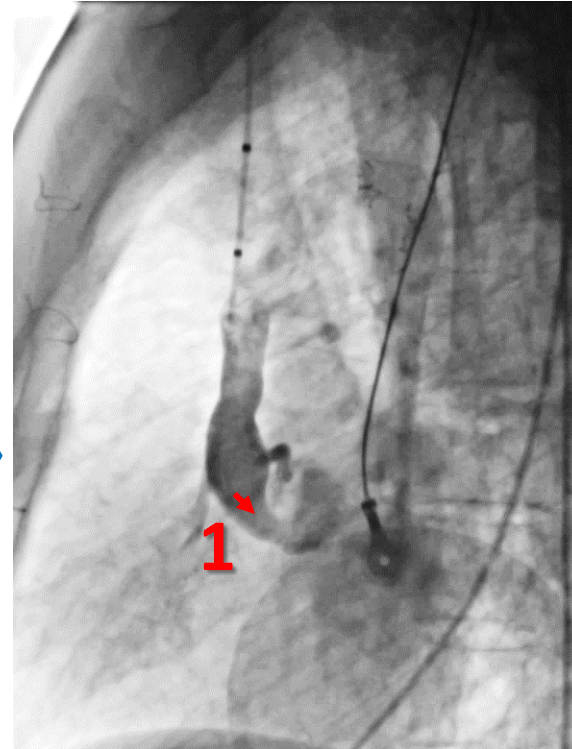
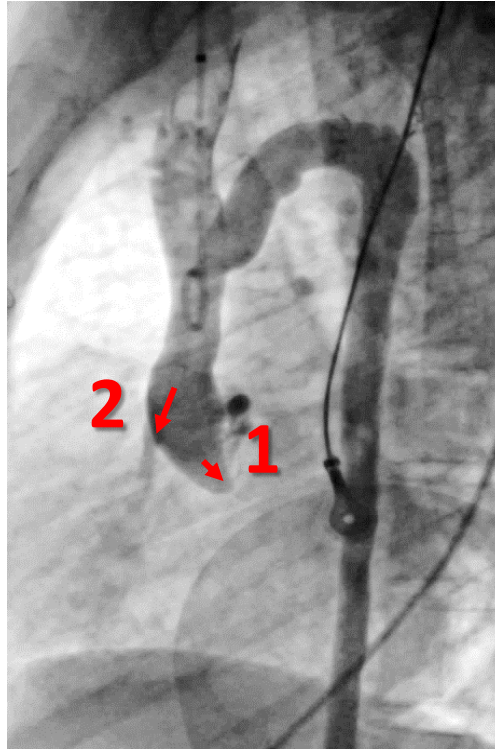
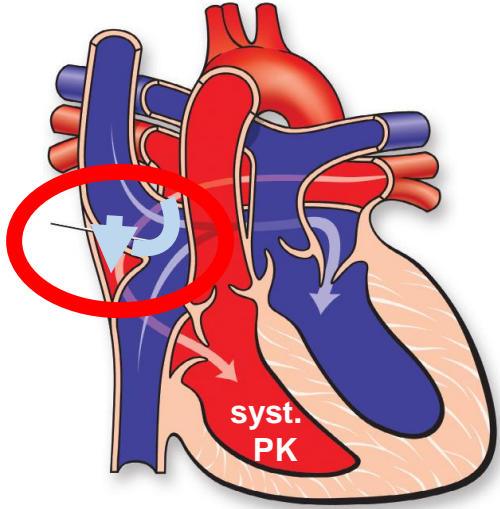


Početné AoPA kolaterály z oboch Asu
Menšie venózne kolaterály z VCS

P.3

➤ **D-TGA** po Mustardovej OP (atriálna korekcia 3/1984)

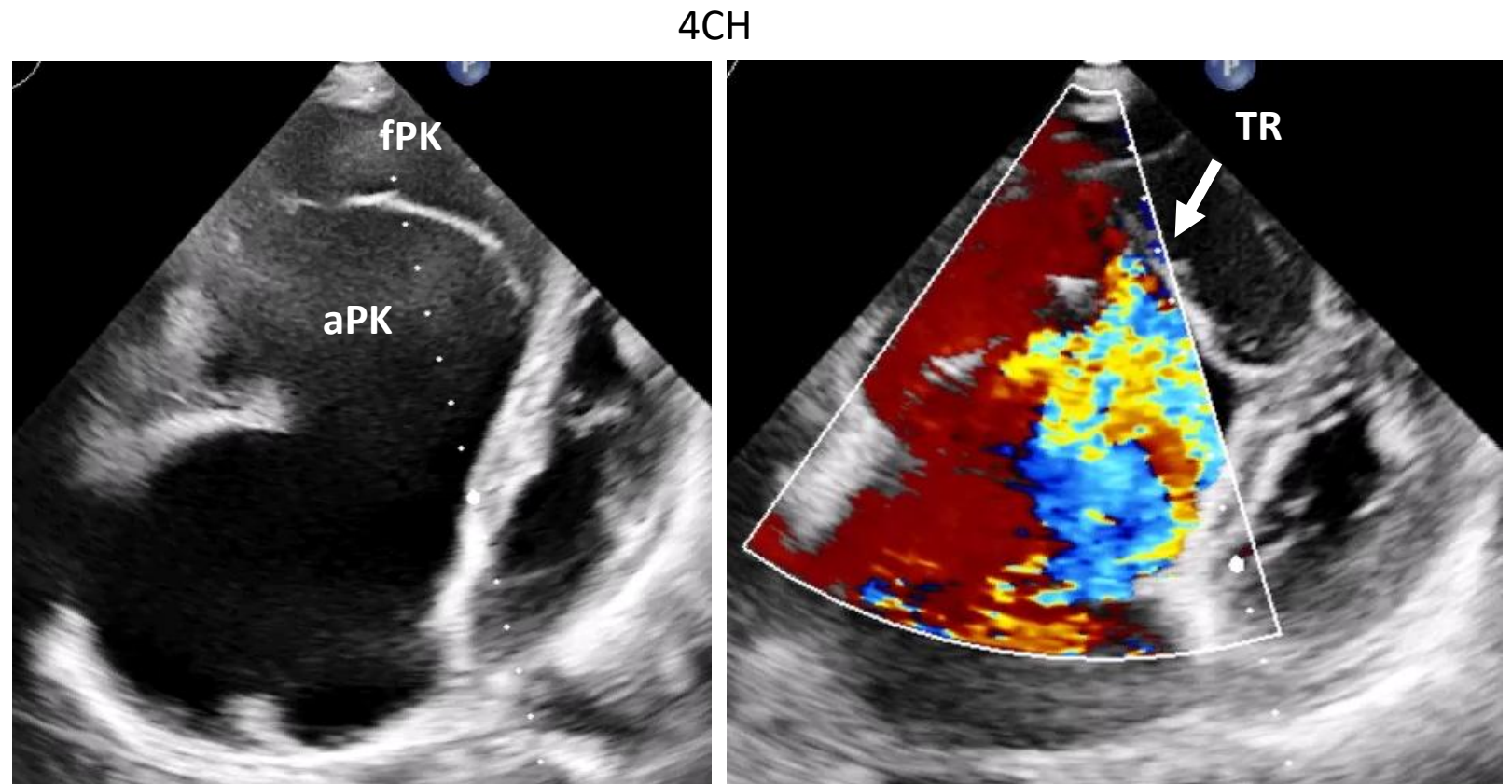
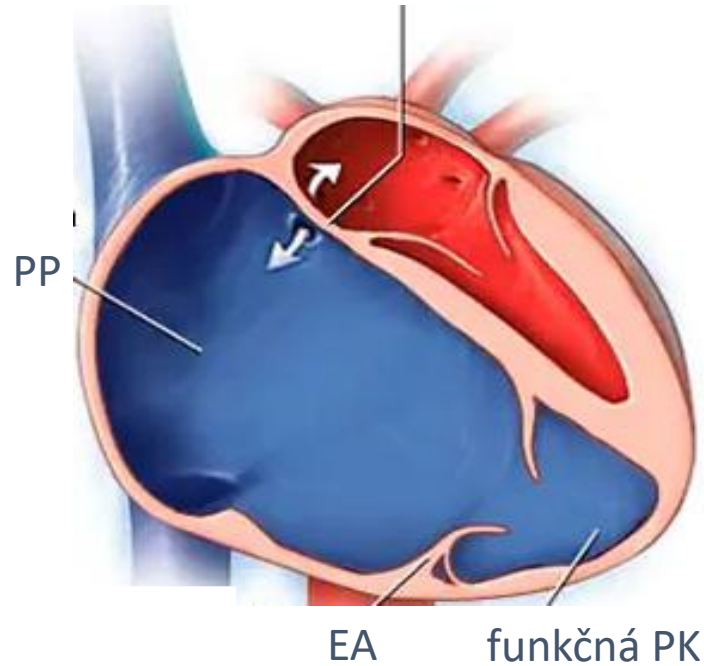
- 1/2023 recid. hemoptýzy; zdroj krvácania = aortopulm. kolaterály, paratracheálne pletence, + **subtotálna oklúzia systémového venózneho tunela v mieste spojenia s VCS, dekomprimuje sa cestou dilat. v.azygos**
- **Intervencia** = embolizácia 3 aortopulm. kolaterál, dilatácia subtotálnej oklúzie ústia VCS do VCI **(1)** a uzáver P-L' skratu medzi VCS a PP (oklúzor Figulla Flex II UNI 17mm) **(2)**.



P.4

- **Ebsteinova anomália TrCh**, typ B podľa Carpentiera (posun septálneho cípu TCH o cca 5,5-7 cm).
- TR závažná; atrializovaná PK (aPK), „true“ = funkčná PK (fPK)
- ASD II.
- Výkonnosť, symptómy, arytmie,....

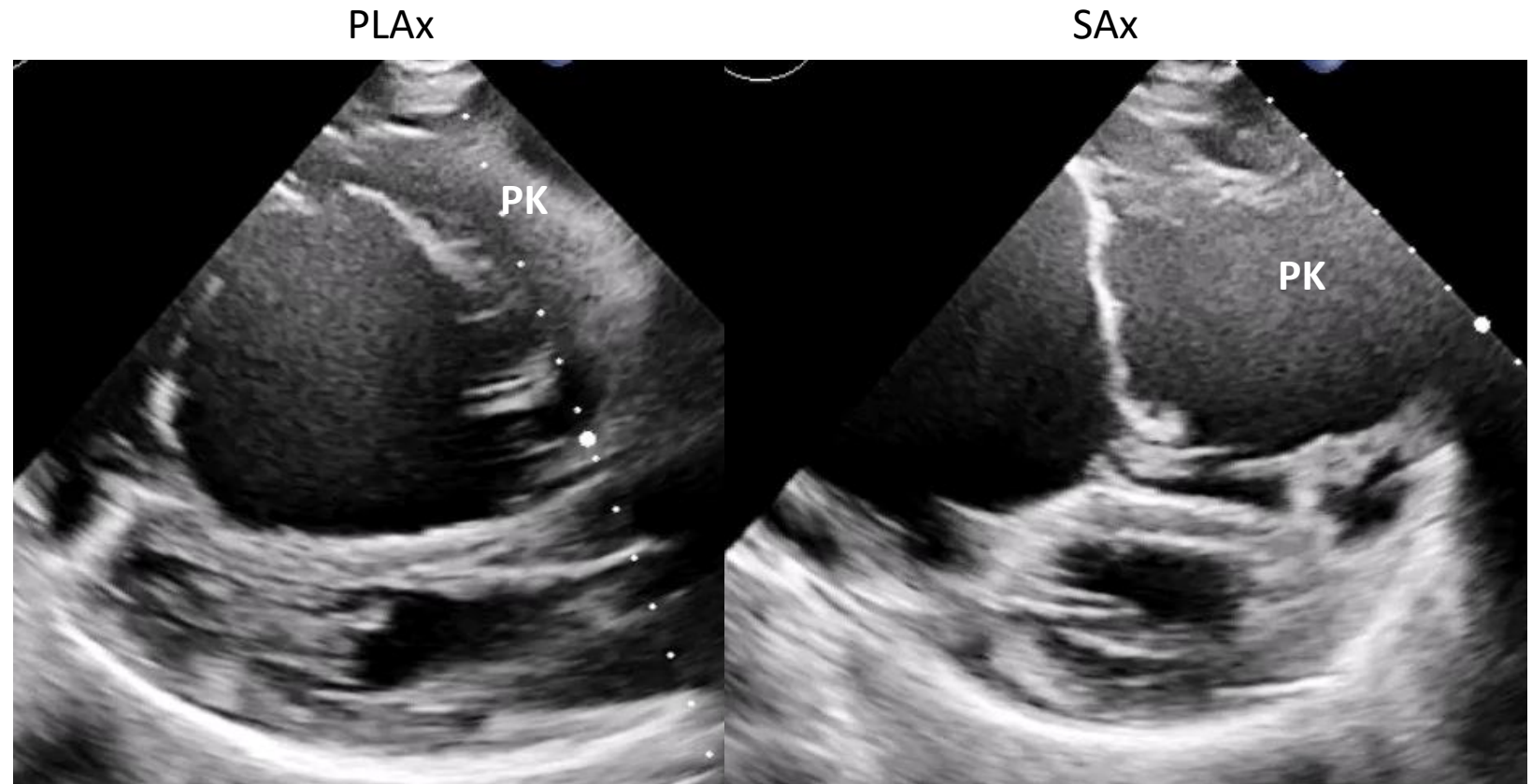
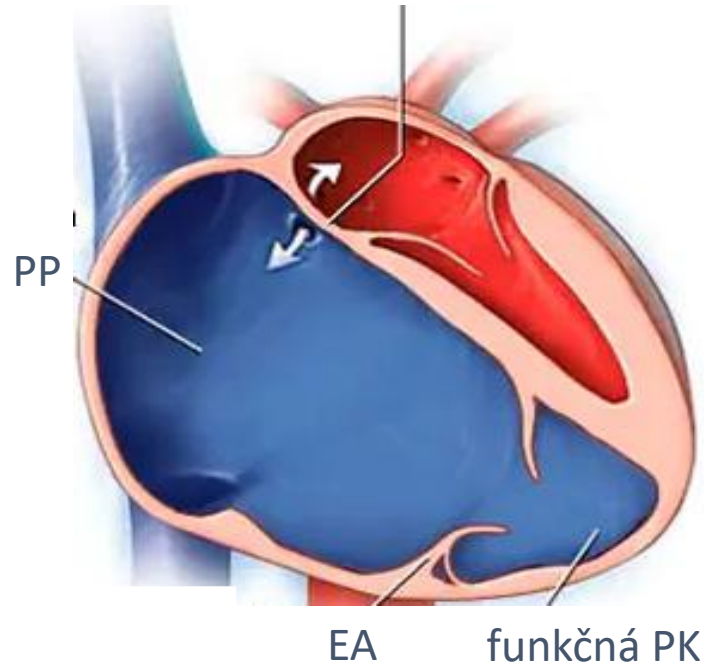
EA – veľkosť a funkcia „true“ PK ?



P.4

- **Ebsteinova anomália TrCh**, typ B podľa Carpentiera (posun septálneho cípu TCH o cca 5,5-7 cm).
- TR závažná; atrializovaná PK (aPK), „true“ = funkčná PK (fPK)
- ASD II.
- Výkonnosť, symptómy, arytmie,....

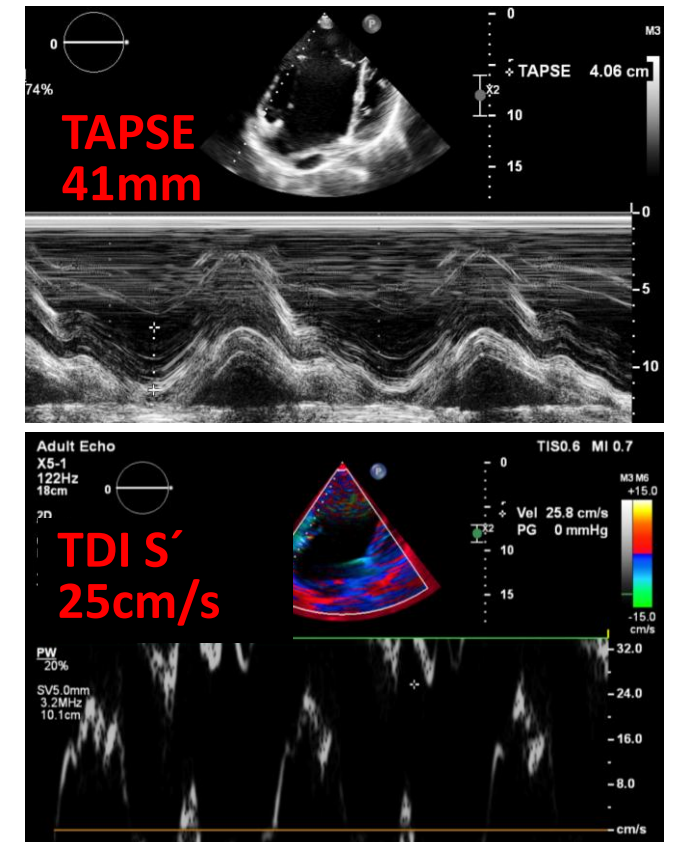
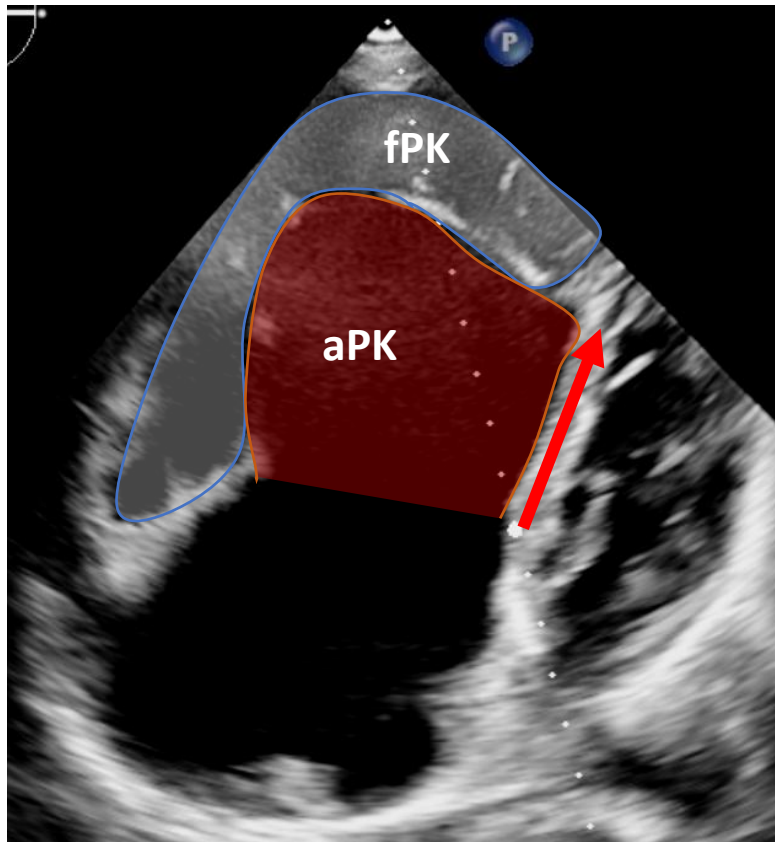
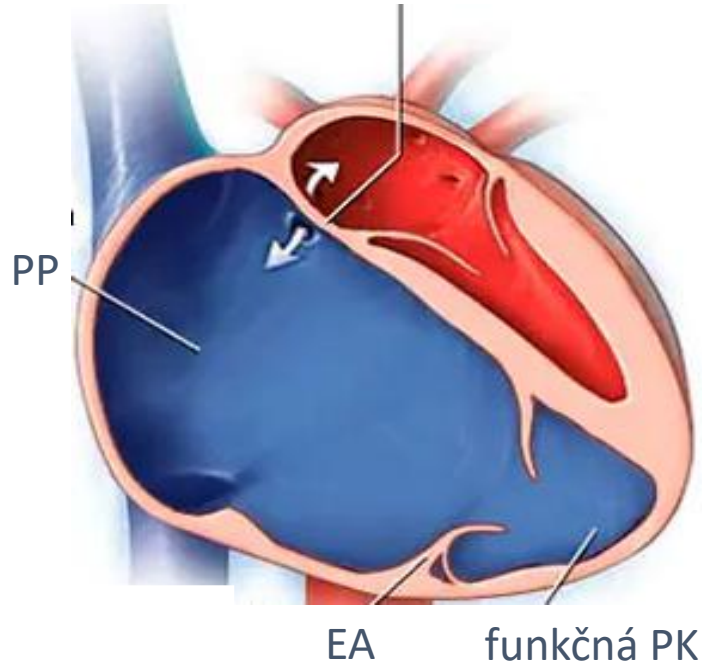
EA – veľkosť a funkcia „true“ PK ?



P.4

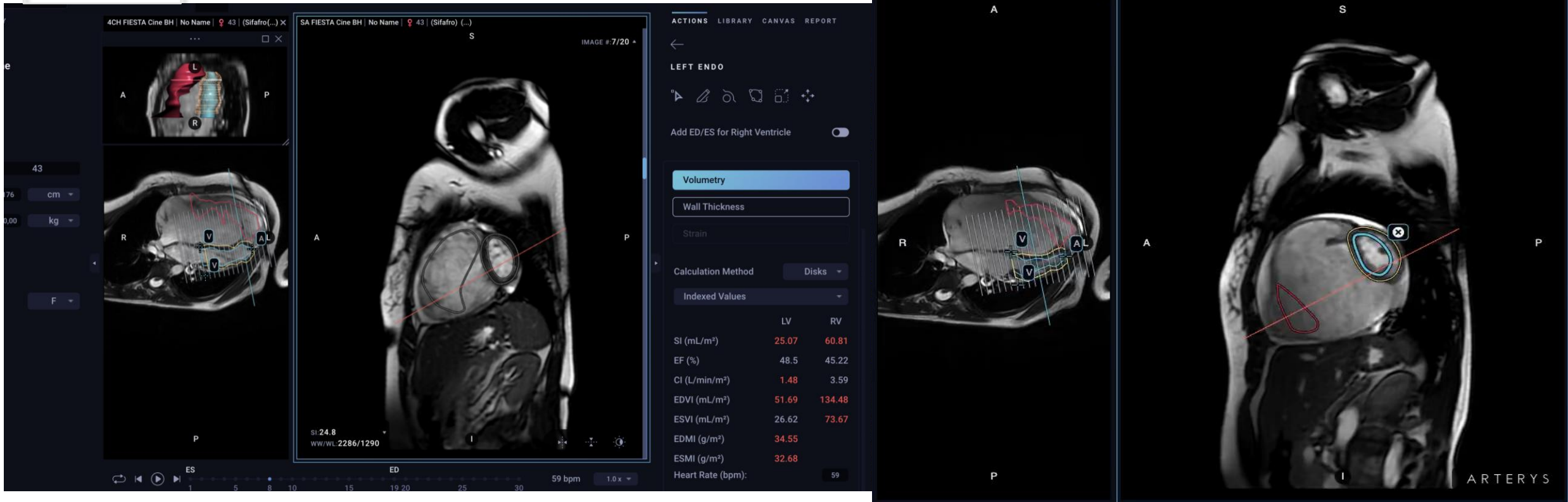
- **Ebsteinova anomália TrCh**, typ B podľa Carpentiera (posun septálneho cípu TCH o cca 5,5-7 cm).
- TR závažná; atrializovaná PK (aPK), „true“ = funkčná PK (fPK)
- ASD II.
- Výkonnosť, symptómy, arytmie,....

EA – veľkosť a funkcia „true“ PK ?

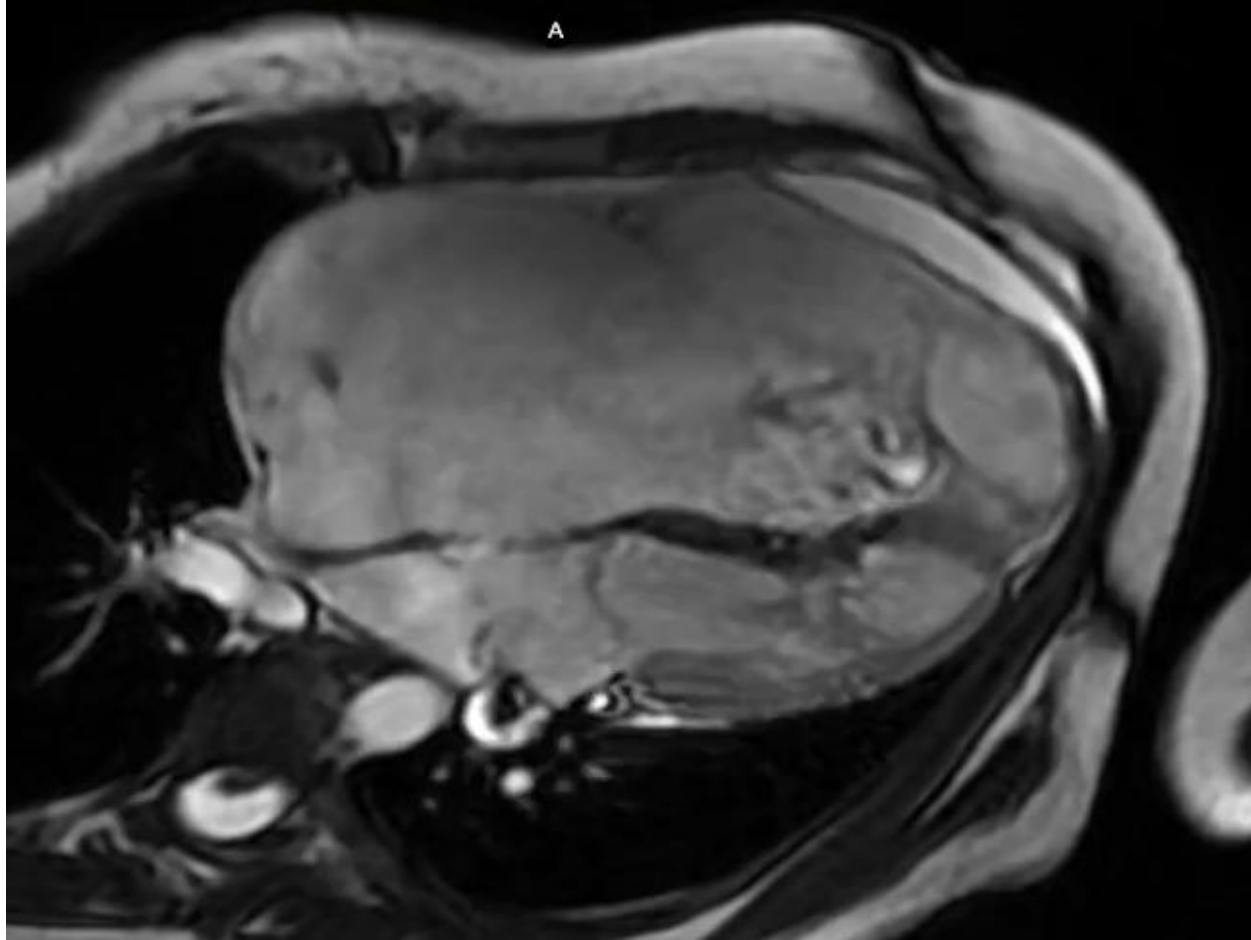


P.4

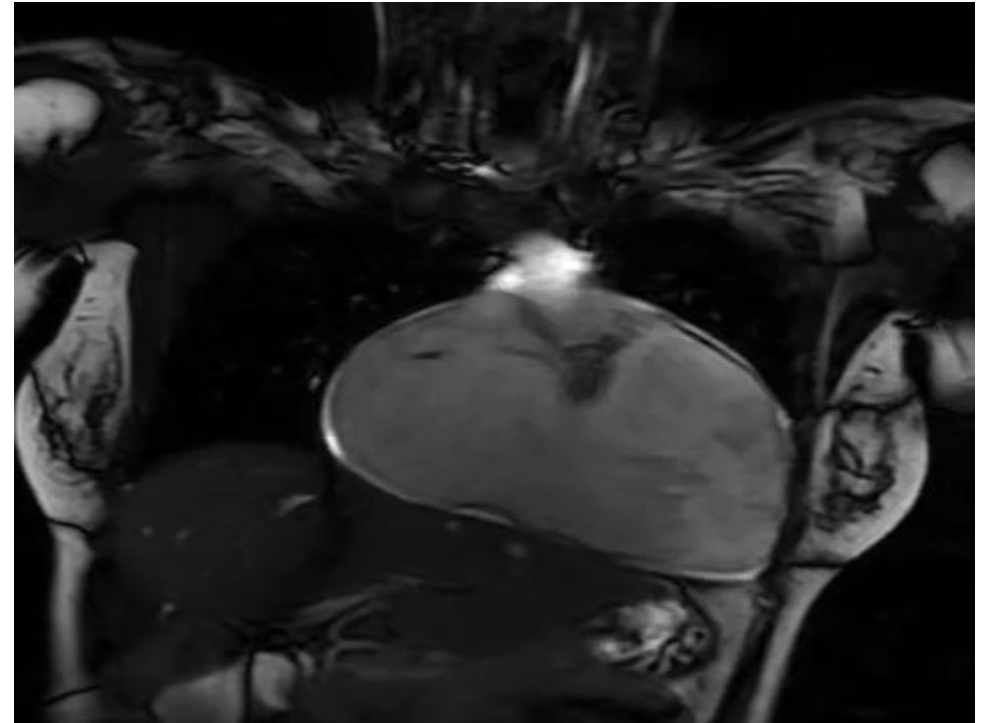
MR



EA- Carpentier B, posun cípu o 7 cm – 3,76 cm²
EF true PK 46%, EDV 134 ml/m²
PP 40 cm², aPK 39 cm², PK 31 cm²



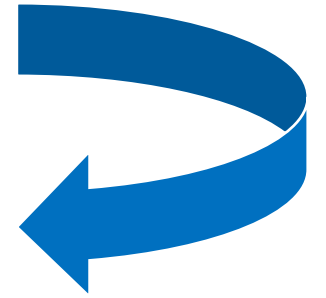
4ch FIESTA



PK FIESTA

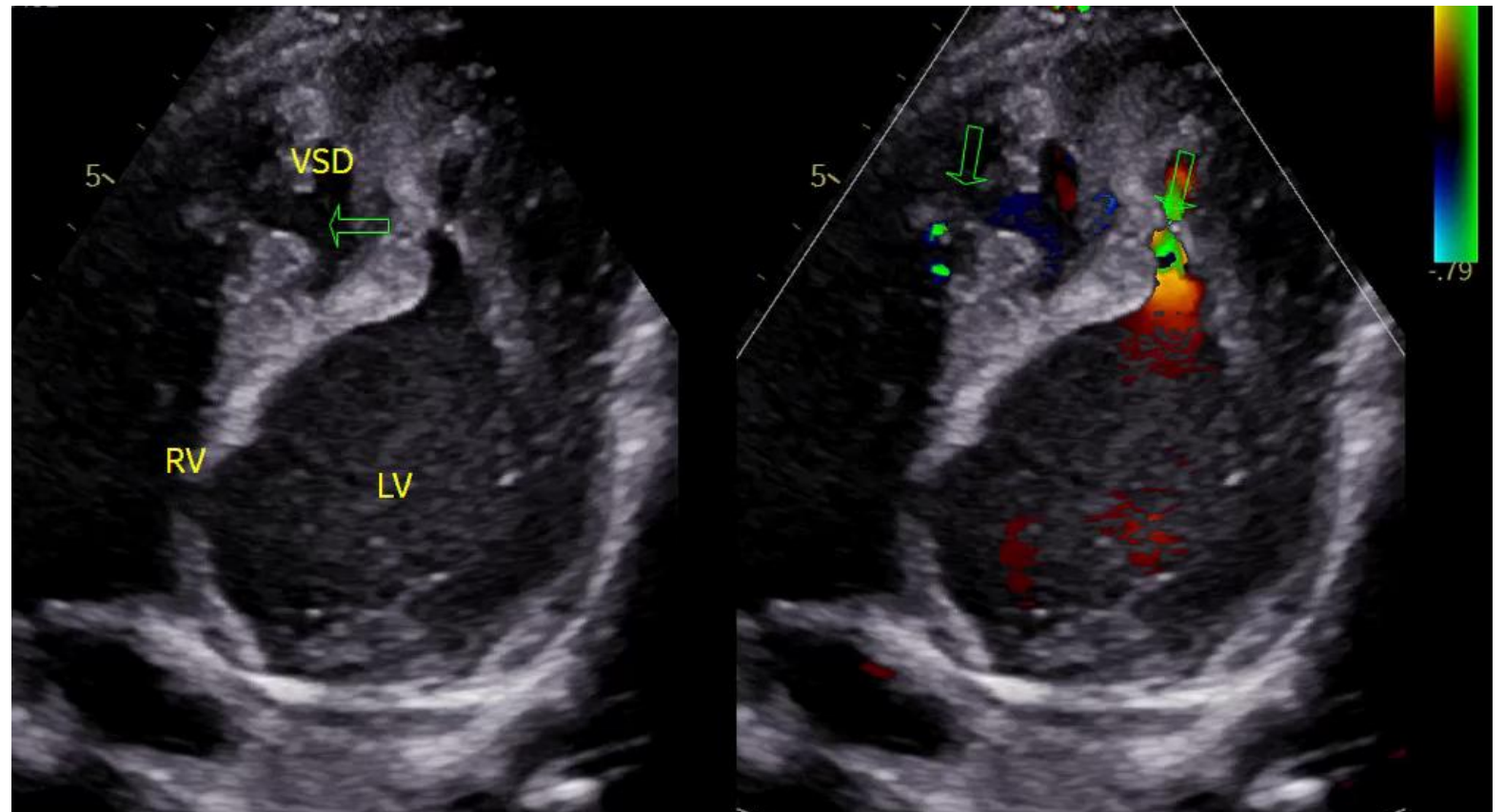
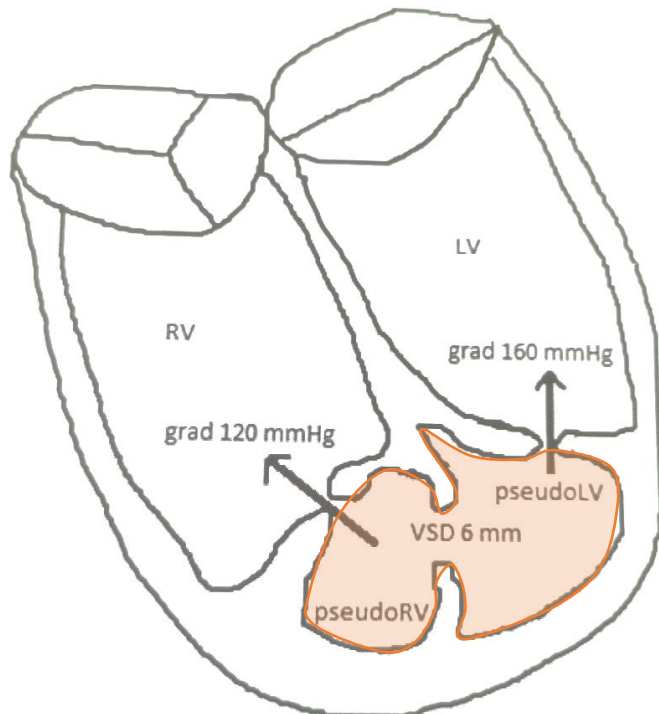
P.5

- Sledovaný v DKC od narodenia, bez intervencie , asymptomat.
- Raritná vrodená morfológická abnormalita → „Double chamber“ LV+RV
→ hrot srdca = pseudokomora/y - nie aneuryzma ani pseudoaneuryzma, hypertrofia a akcentovaná trabekulizácia apexu srdca, reštrikčne komunikuje s „normálnou“ časťou ĽK aj PK



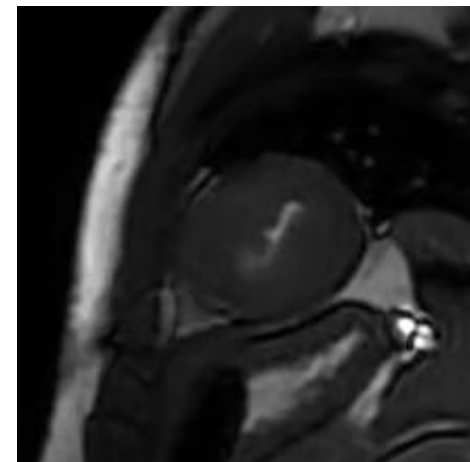
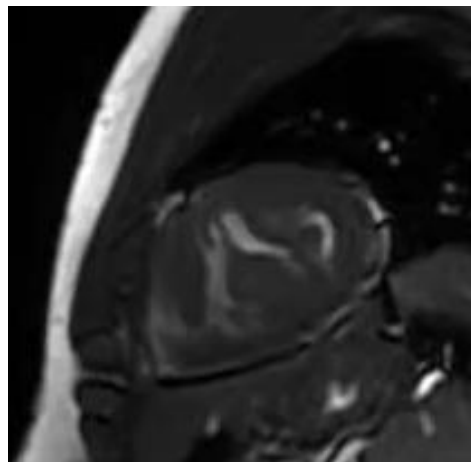
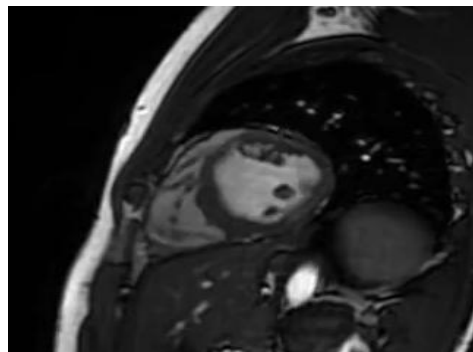
4CH

„Dvoj dutinová“ PK + ĽK

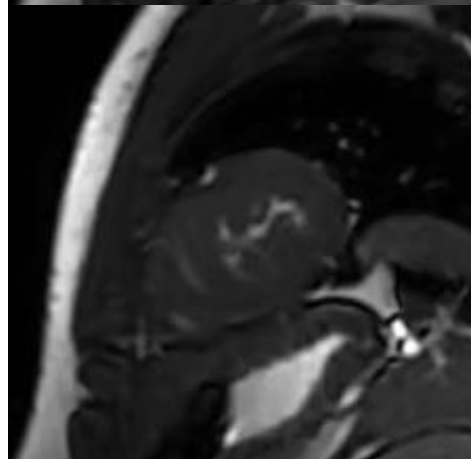
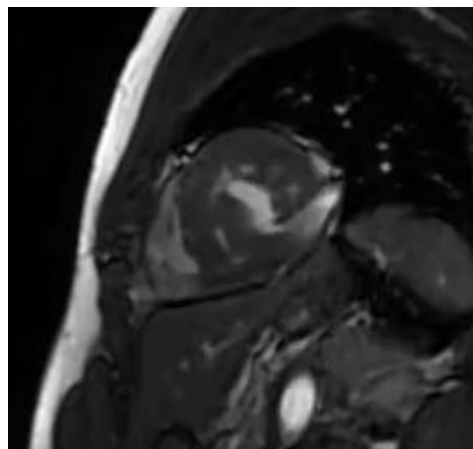
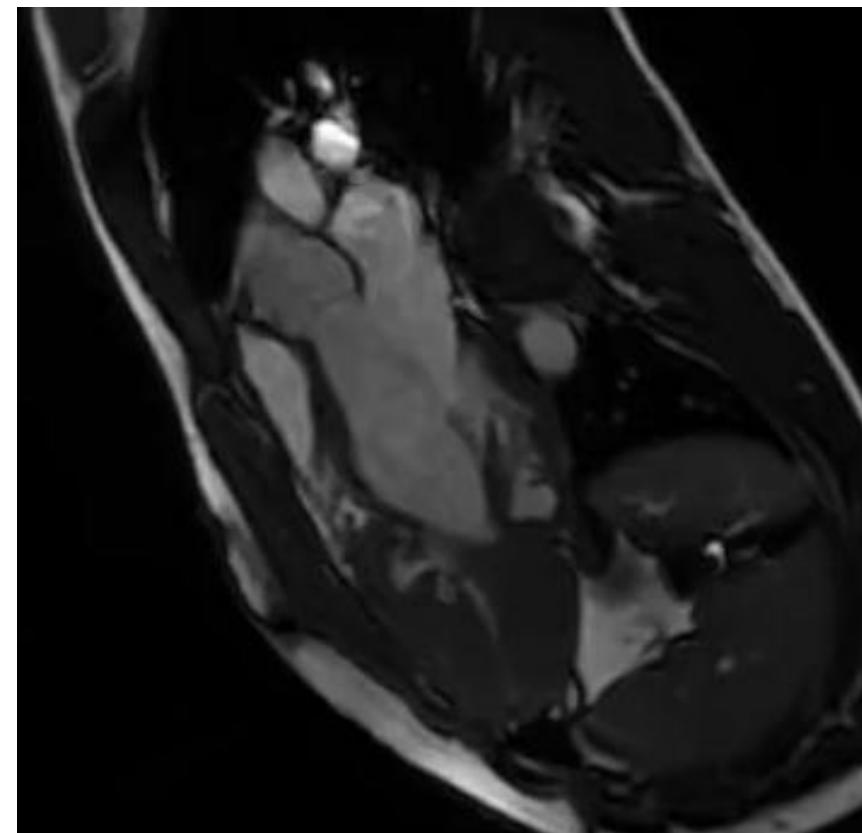
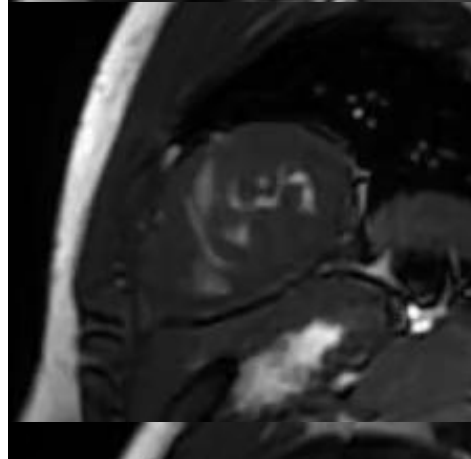
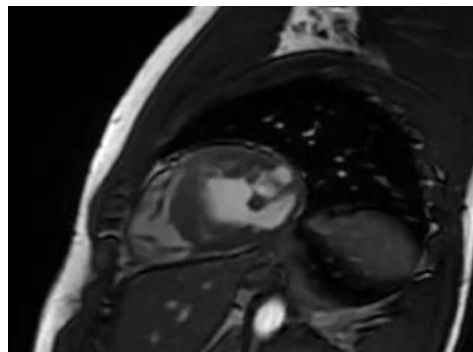


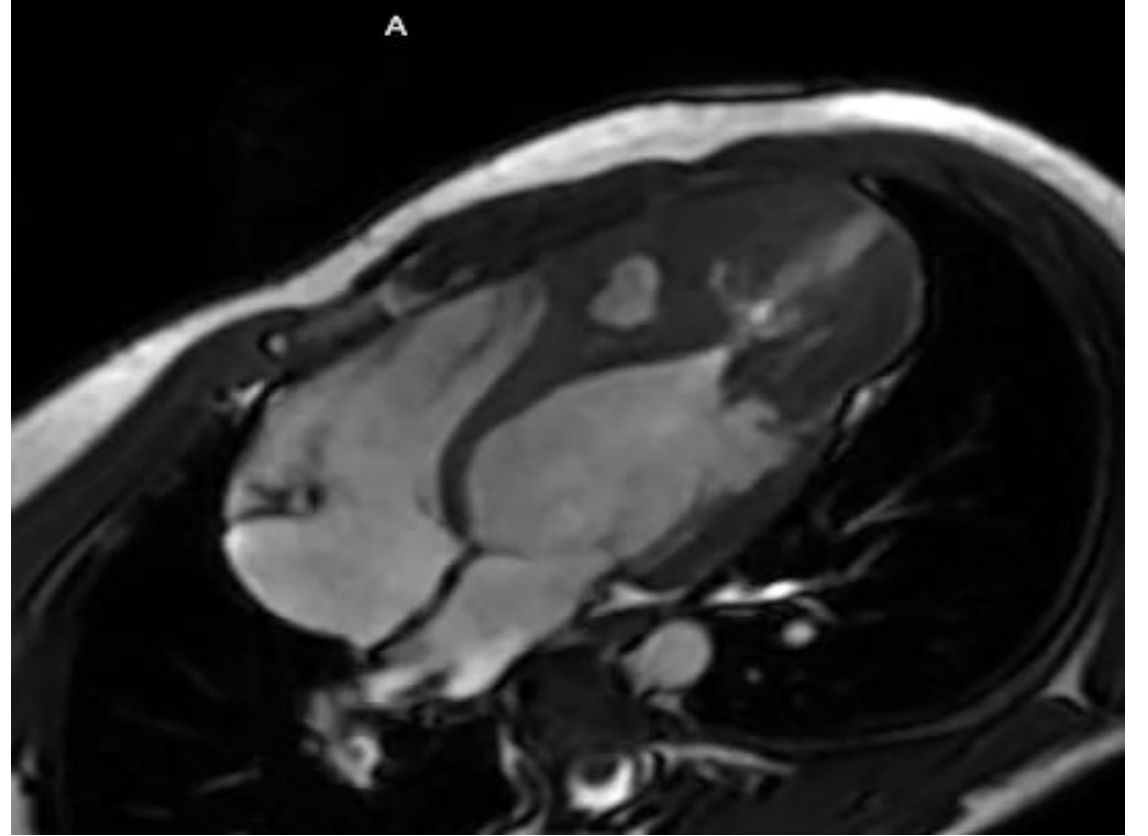
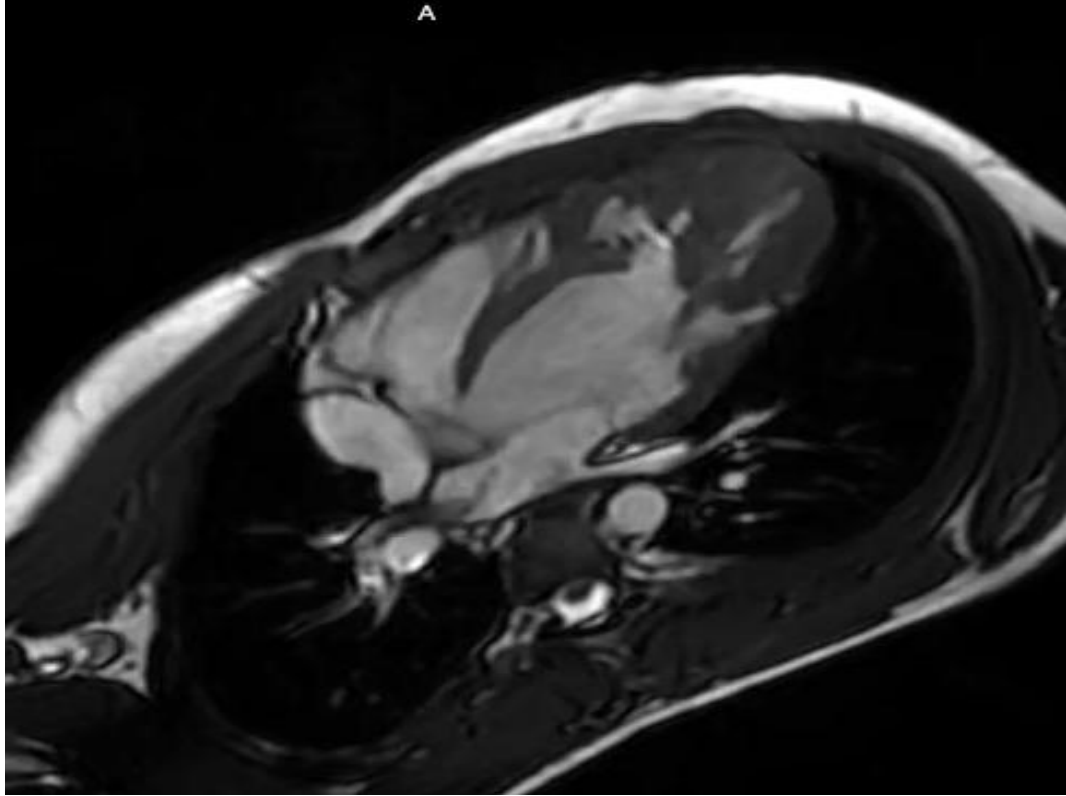
P.5

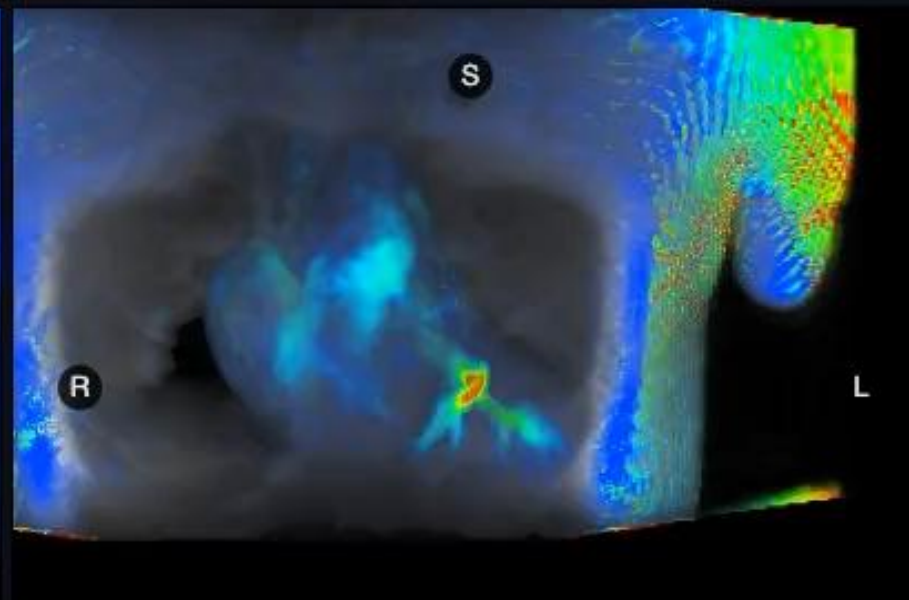
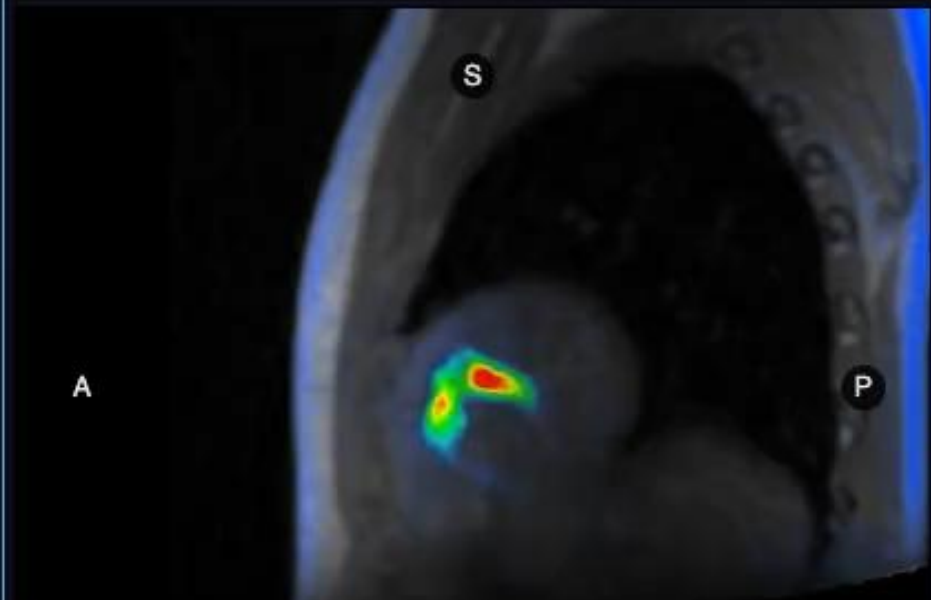
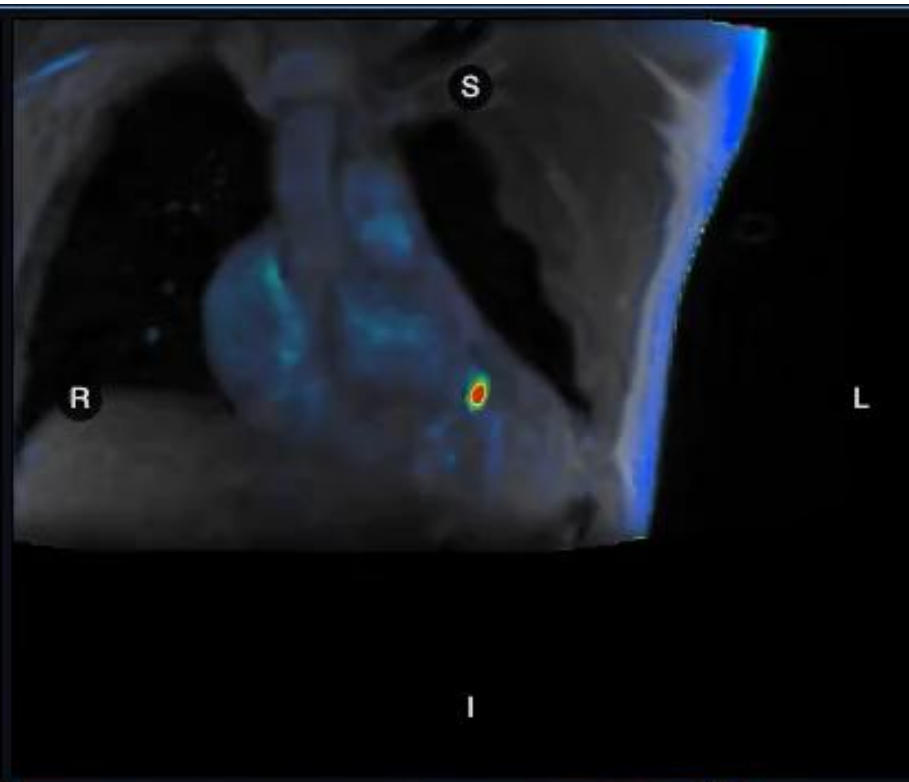
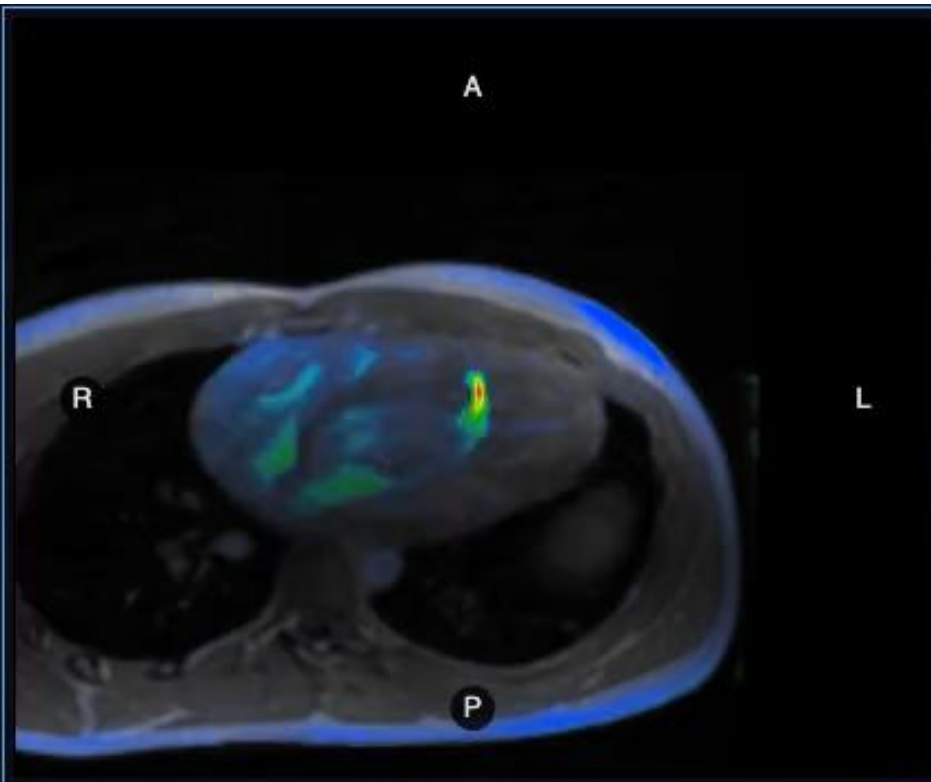
MR



Dvojdutinová LK aj PK
EF LK 45%
EF PK 53%
Qp:Qs 1







Záver

- **echokg** posudzovanie veľkosti PK, region. a globálnej funkcie PK vyžaduje „multi parametrový“ prístup:
 - viaceré parametre 2D a 3D
 - **strain** (odhalenie včasných štádií dysfunkcie PK pri normálnych klasických parametroch funkcie PK: TAPSE, FAC)
- v dif. dg. a manažmente nevyhnutné **MR, multimodalitné hodnotenie PK**