

Multimodalitní zobrazení u srdečních tumorů

Magnetická rezonance

Pleva Martin

Nemocnice Podlesí, a.s., Třinec

Vítkovická nemocnice, a.s., Ostrava

MR– přednosti a limitace

- **nejlepší tkáňové rozlišení**
- dobře tolerovaná k.l.
- schopnost zobrazit parakardiální struktury
- horší dostupnost
- délka vyšetření
- spolupráce pacienta
- KI vyšetření
- mobilita útvarů

Klasifikace

- **pseudotumory – „non-neoplastic“ útvary**
- **tumory**
 - benigní
 - maligní
 - *primární*
 - *sekundární*

Hodnocení patologických útvarů

- lokalizace: síně/komory – dutina/stěna, perikard
- velikost ... tvar ... mobilita ... vztah k ost. strukturám (prorůstání)
- **signálová charakteristika:**
 - *SSFP/T1/T2W obrazy, FAT SAT*
 - *perfúze + časné/pozdní postkontrastní skeny – sycení*
 - *tagging, mapping*
- přidružené patologie – jizva po IM ...
- maligní onemocnění v anamnéze

Pseudotumory

- varianty normy
 - *crista terminalis, Eustachova chlopeň, tuková hypertrofie IAS, epikardiální tuk*
- vegetace (TT/TEE)
- trombus
- perikardiální cysta
- kaseózní kalcifikace mitrálního anulu ...

Value of CMR for the Differential Diagnosis of Cardiac Masses

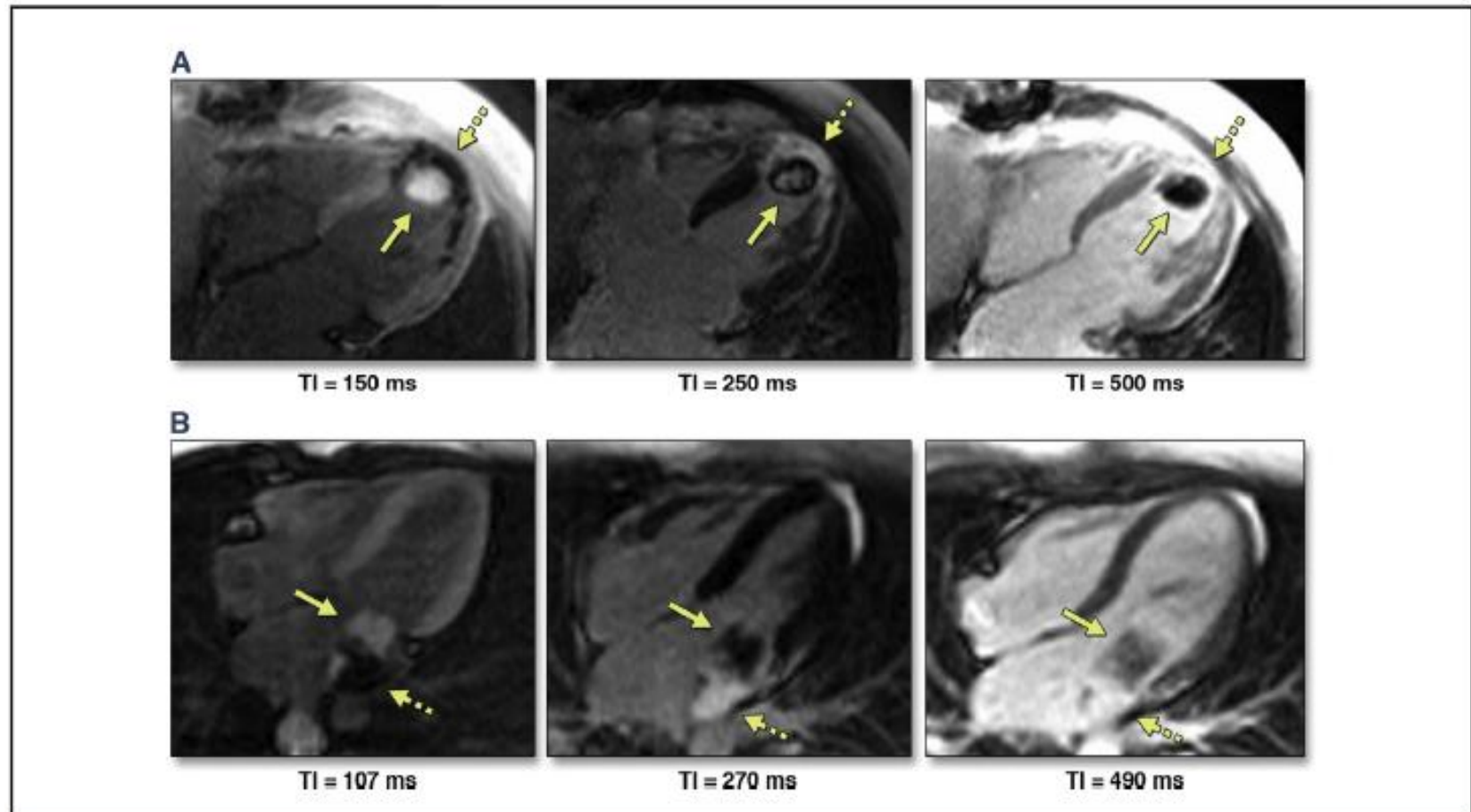
CME

Pablo Pazos-López, MD,*† Eduardo Pozo, MD,* Maria E. Siqueira, MD,* Inés García-Lunar, MD,*†
 Matthew Cham, MD,* Adam Jacobi, MD,* Frank Macaluso, BS,* Valentín Fuster, MD, PhD,*†
 Jagat Narula, MD, PhD,* Javier Sanz, MD*

TABLE 3 Accuracy of CMR Features for the Diagnosis of Thrombus (Versus Tumor)

	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Accuracy (%)
Pre-contrast visualization (-)	23	100	100	39	48
Diameter <2.4 cm	84	78	88	72	82
Area <4.1 cm ²	89	80	89	79	86
Homogeneous (+)	99	54	81	96	84
Motility (-)	87	33	72	56	69
T2w-TSE hyperintensity (-)	58	85	81	65	71
FPP (-)	96	70	81	93	85
LGE (-)	95	71	86	88	87
Typical TI scout pattern*	94	98	98	91	95
T1 time ≥422 ms	67	80	77	71	73

*Hyperintensity/isointensity with short TI and hypointensity with long TI compared with the normal myocardium.
 NPV = negative predictive value; PPV = positive predictive value; other abbreviations as in Tables 1 and 2.



Trombus v levé komoře



MRI:

- senzitivita: 88 %, specificita: 99 %

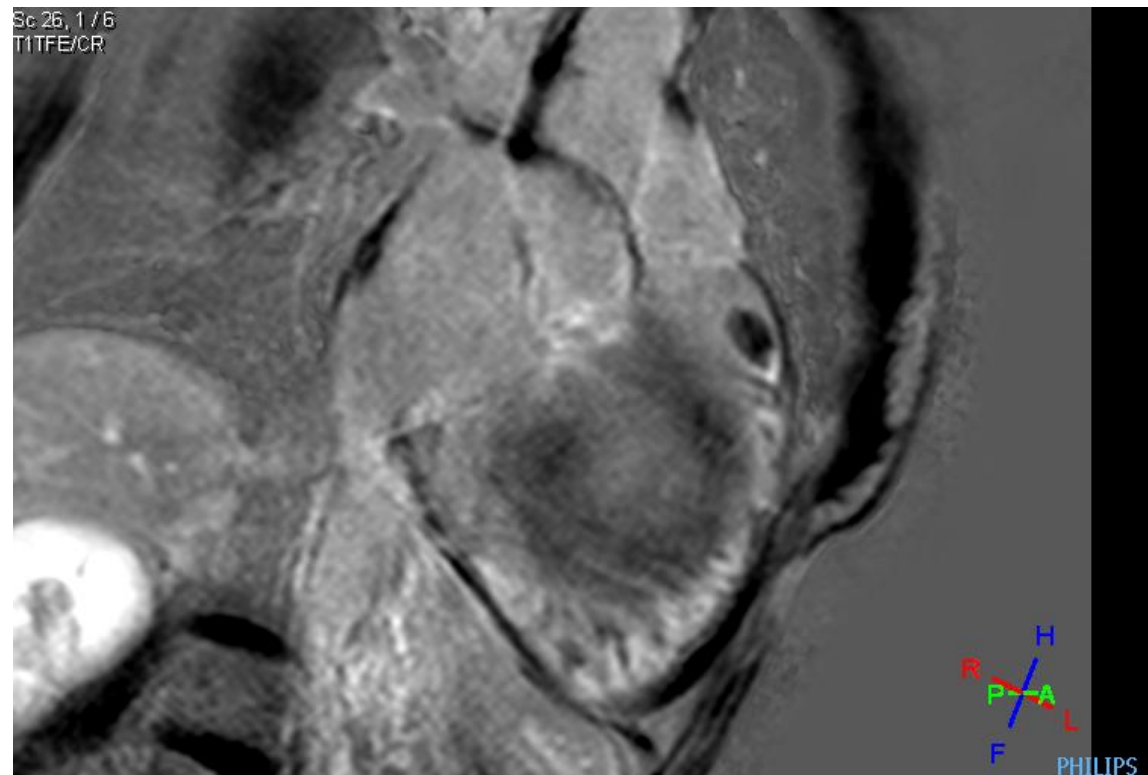
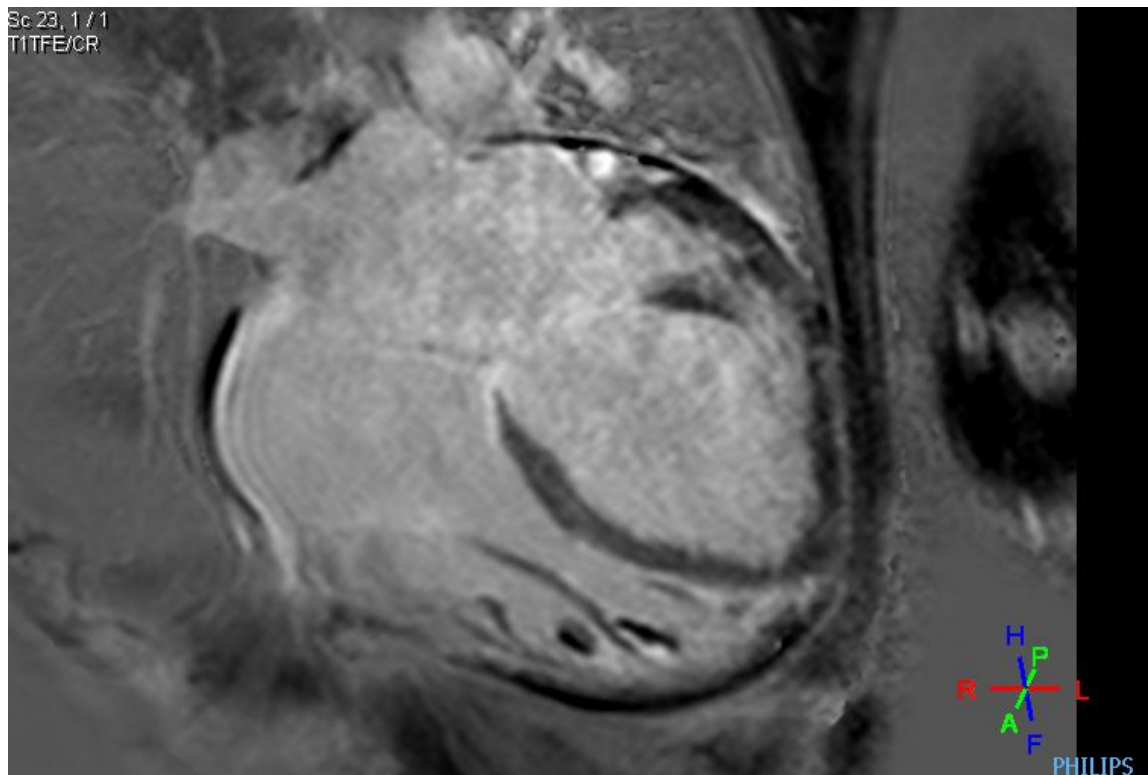
TEE:

- senzitivita: 40 %, specificita 96 %

TTE:

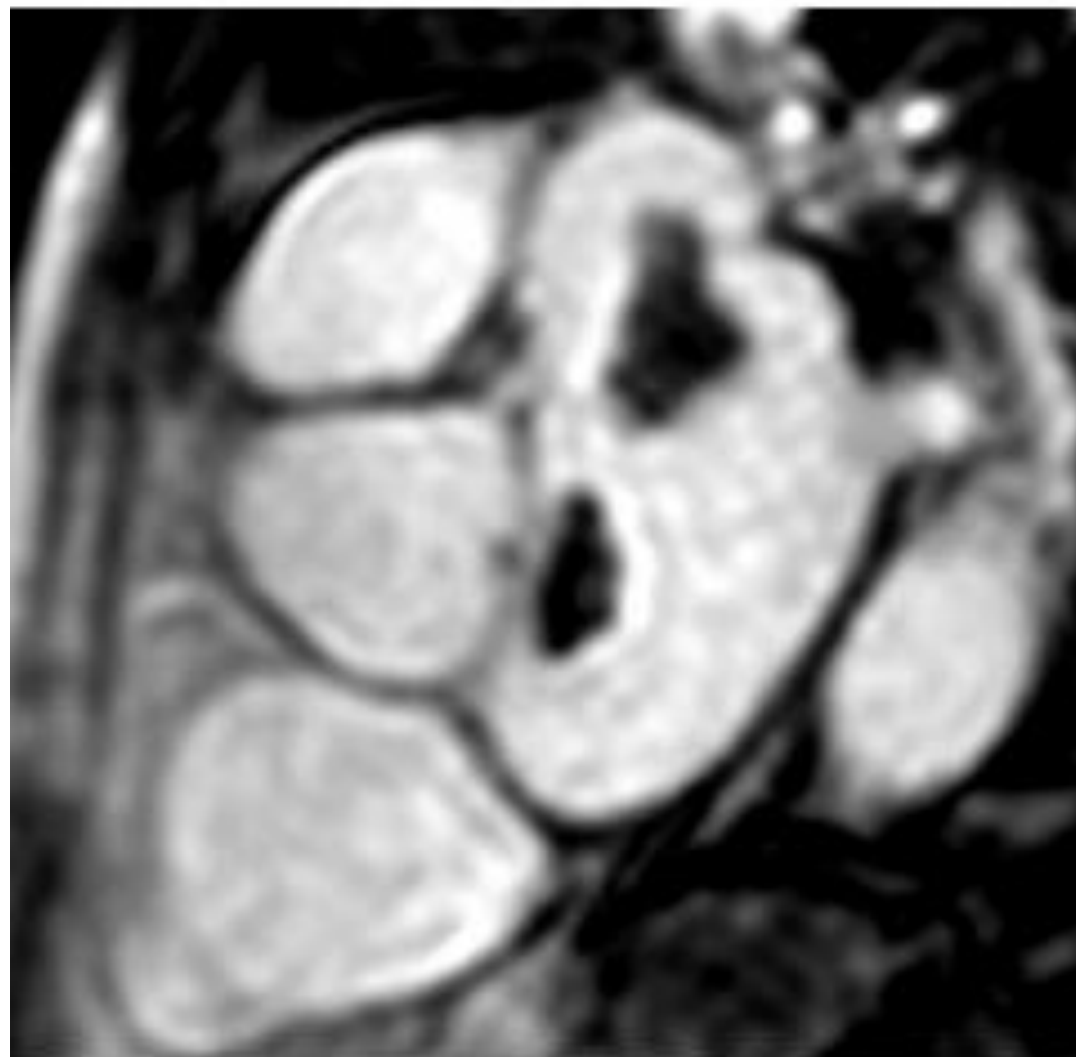
- senzitivita: 23 %, specificita 96 %

Tromby v pravé komoře



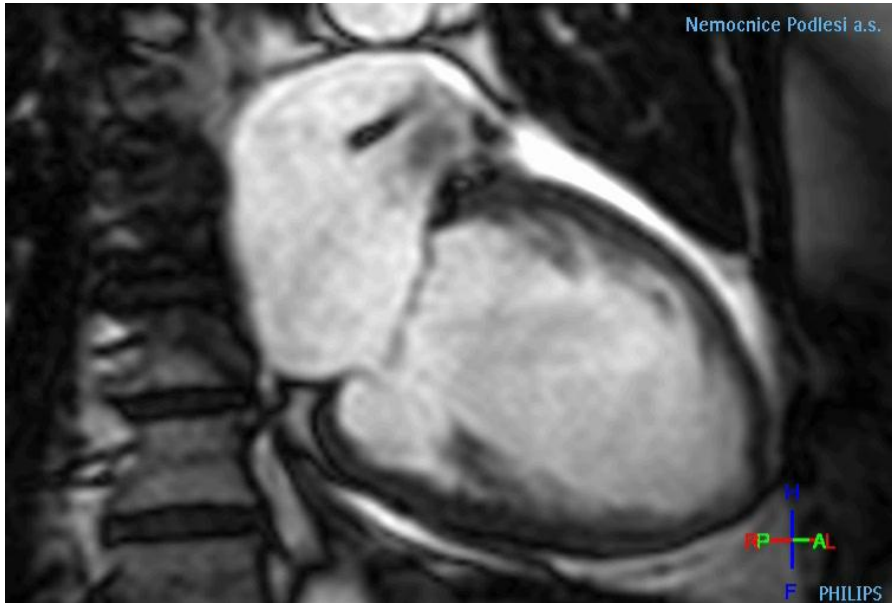
Trombus v LS (mimo LAA)

- zásadní role CMR v diferenciální diagnóze mezi trombem a tumorem (perfúze, časně a pozdní sycení)



Trombus v LS

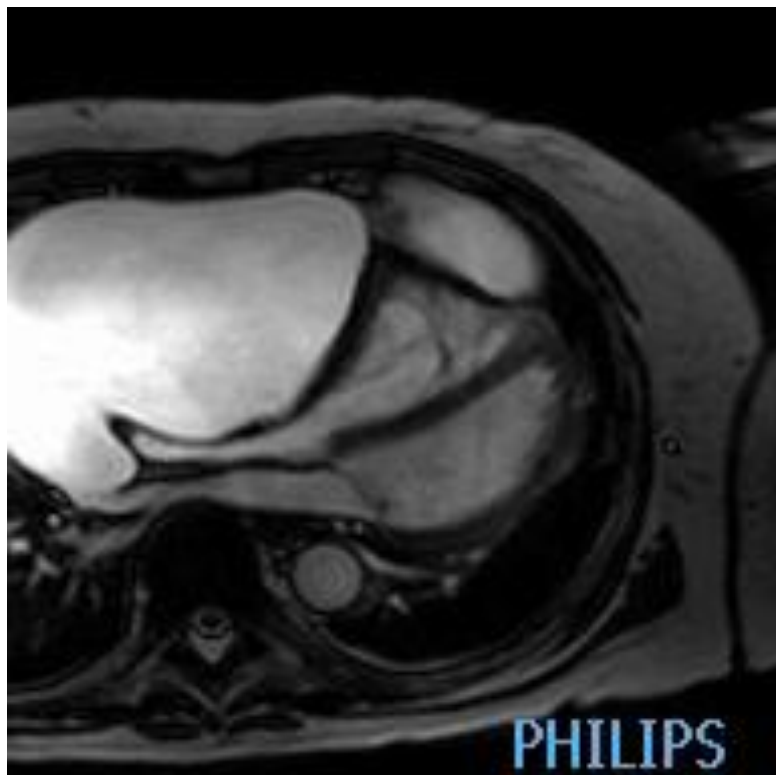
CMR k vyloučení trombu v LS

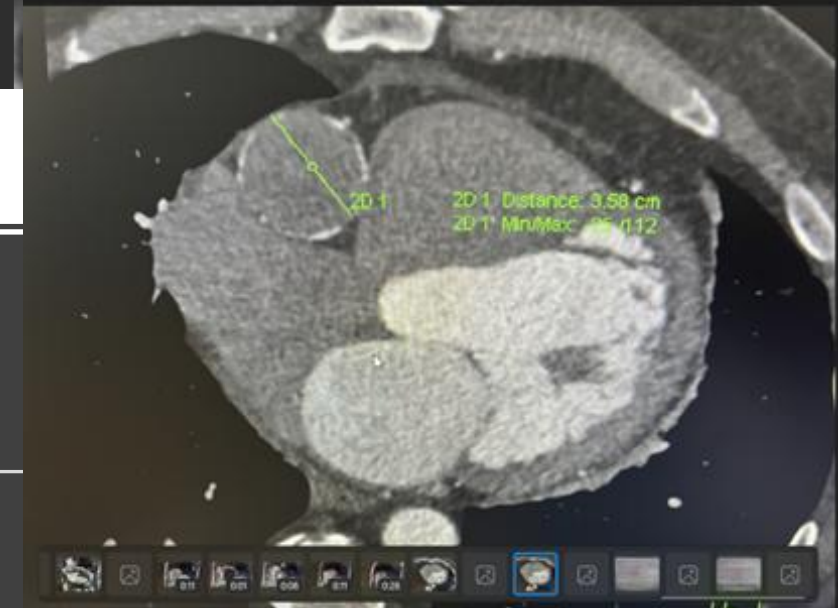
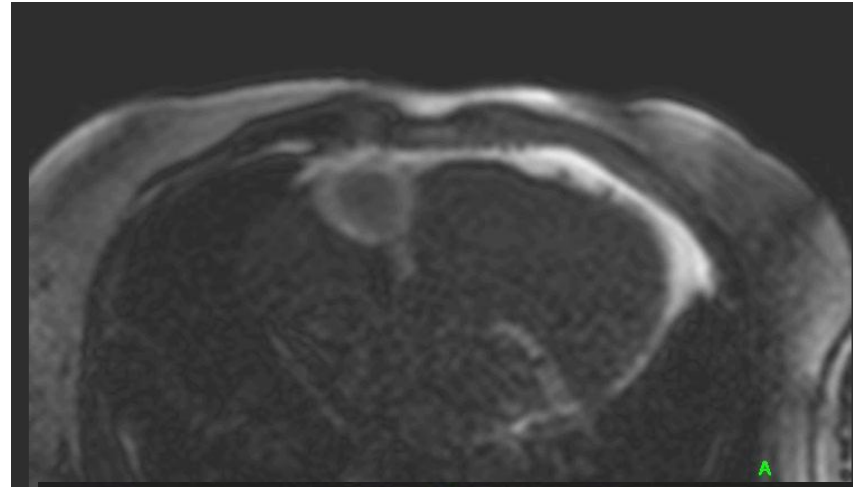
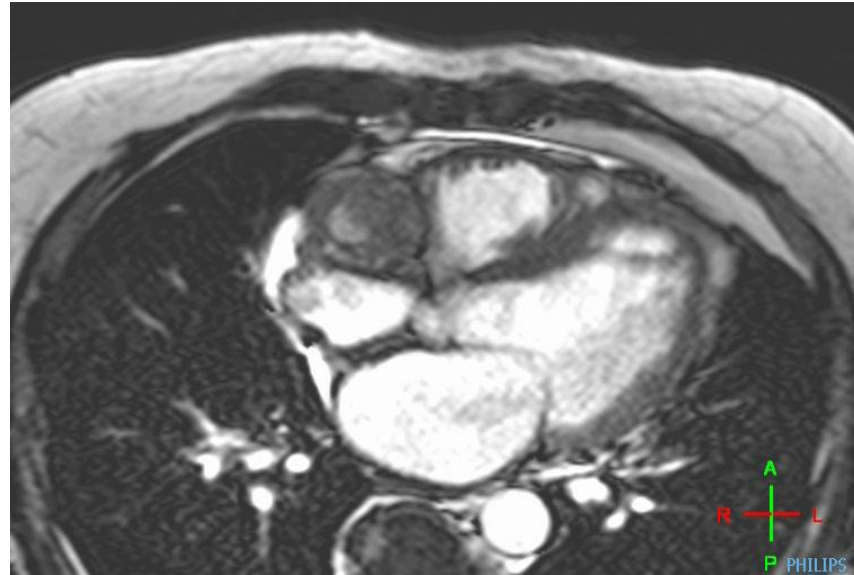
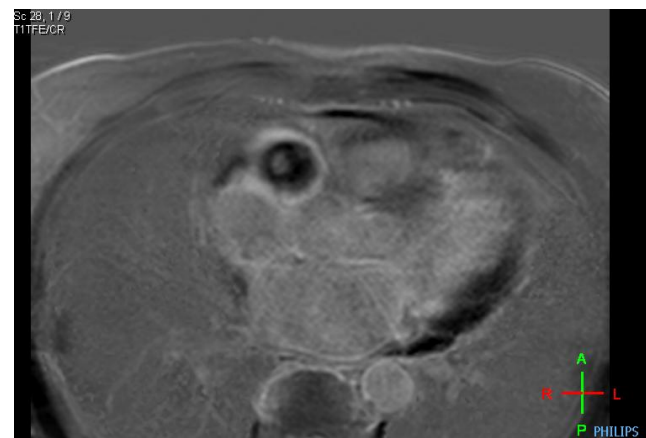
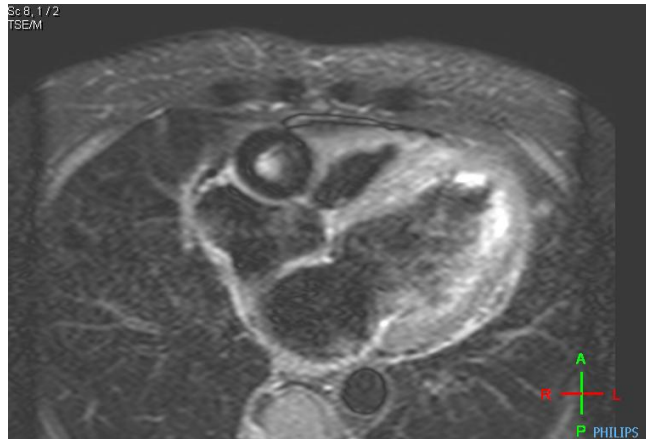
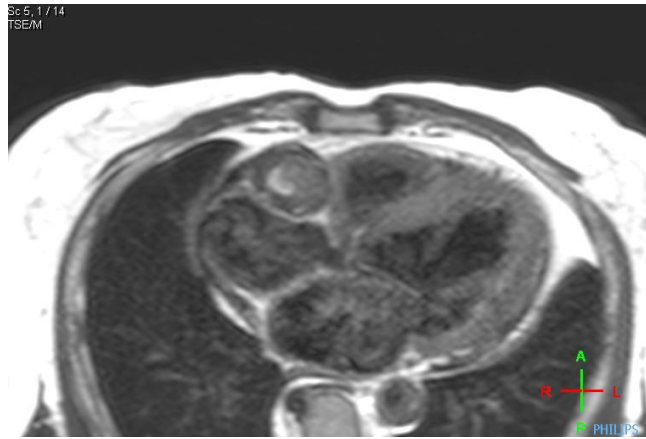


MRI x TEE

- senzitivita 44 %
- specificita 67 %
- PPV 80 %
- NPV 29 %

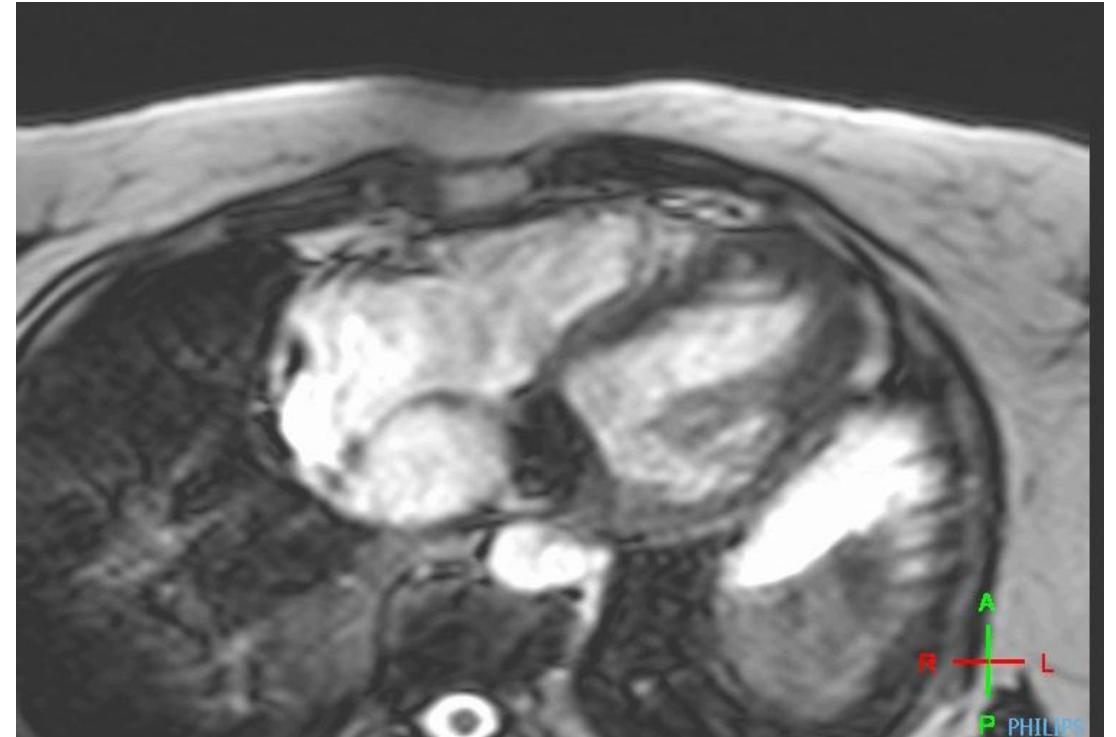
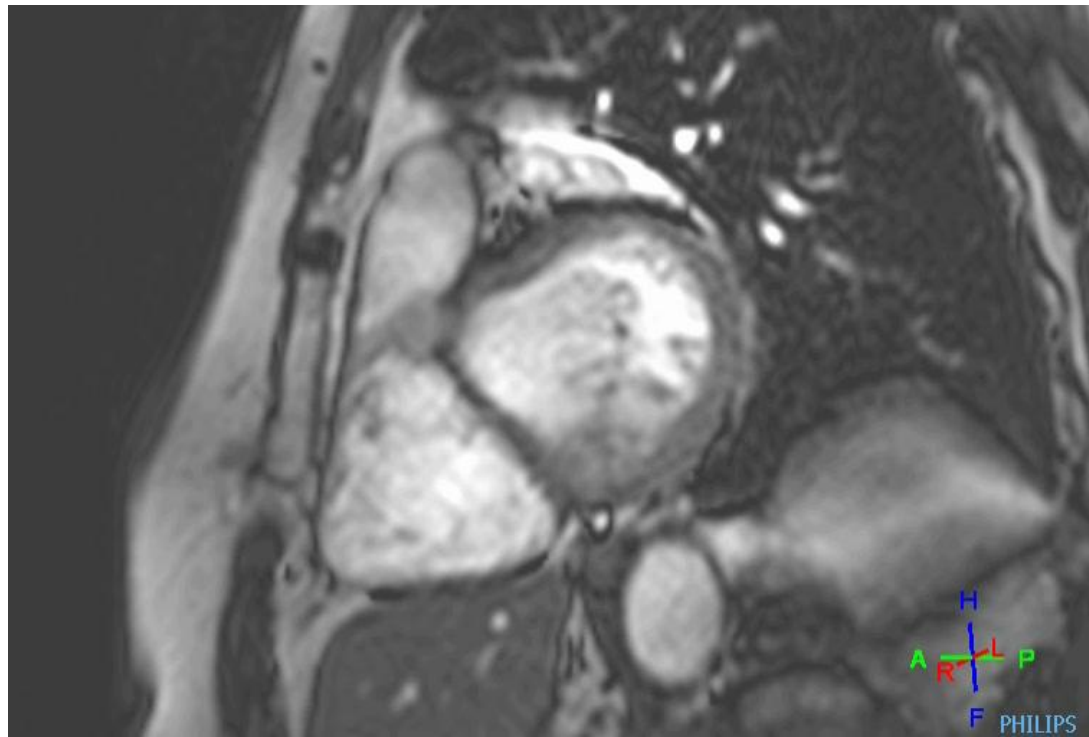
Perikardiální cysta



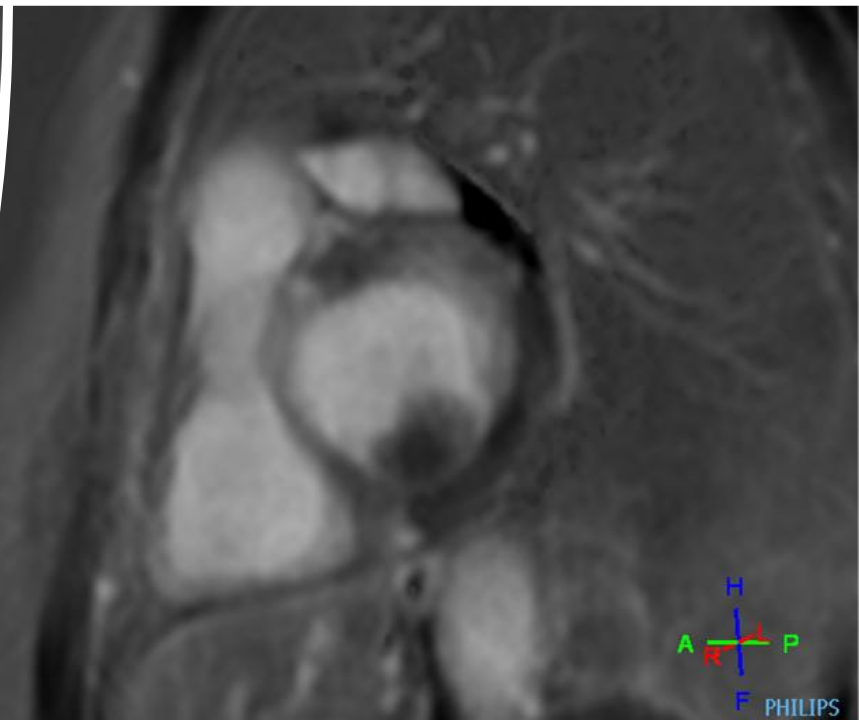
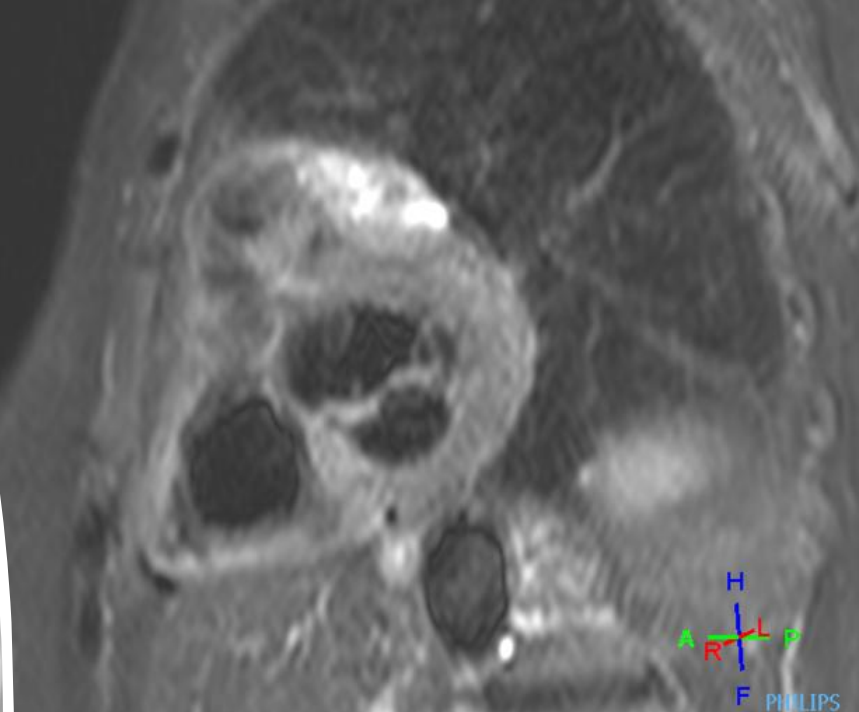
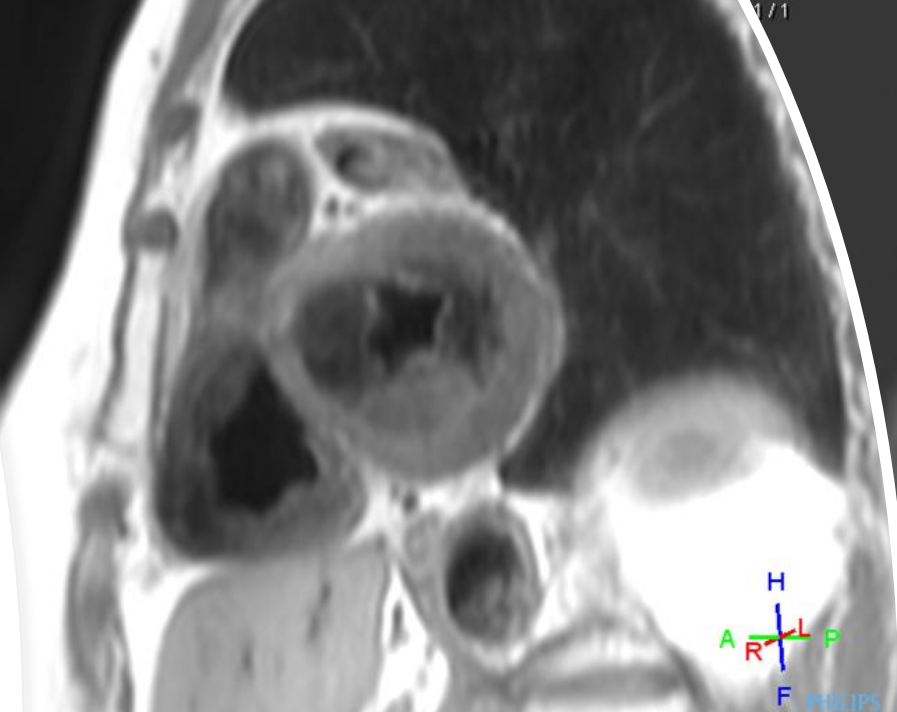


Aneurysma ACD

Kaseózní kalcifikace mitrálního anulu



Kaseózní kalcifikace mitrálního anulu



Primární tumory

- incidence 0,15-0,28 %
- 75-90 % benigních

Table 2 Malignant tumor characteristic

Size	More than 5 cm
Number	More than one
Location	Right heart involvement or more than one cardiac chamber
Implantation	Broad base of implantation
Infiltration	Direct infiltration of structures such as myocardium, valves, epicardial fat and pericardial leaflets
Effusion	Pericardial or pleural hemorrhagic effusion
Signal intensity	Heterogeneous signal intensity in T1-weighted and T2-weighted images
Perfusion	Heterogeneous enhancement
EGE and LGE	Heterogeneous enhancement

Tumory

Cardiac masses	Cine-MR imaging	T1-weighted	T2-weighted	LGE
Myxoma	Mobile lesion	Isointense, heterogeneous	Hyperintense, heterogeneous	Heterogeneous enhancement
Papillary fibroelastoma	Hyperintense mobile mass, peritumoral turbulent flow	Isointense	Isointense	Hyperintense
Rhabdomyoma	Slightly hyperintense, intramural mass	Iso- or hyperintense	Slightly hyperintense	Hypointense or isointense
Hemangioma	Hyperintense	Isointense	Hyperintense	Heterogeneous prolonged enhancement
Fibroma	Hypo- or isointense	Iso- or hyperintense	Hypointense	Homogeneous late enhancement
Lipoma	Hyperintense, chemical-shift dark rim	Homogeneous hyperintense	Homogeneous hyperintense	None
Teratoma	Heterogeneous intense	Heterogeneous intense	Heterogeneous intense	Heterogeneous enhancement
Mesothelioma	Hypointense nodule	Isointense	Heterogeneous intense	Heterogeneous enhancement
Angiosarcoma	Isointense, heterogeneous	Heterogeneous hyperintense "cauliflower"	Heterogeneous hyperintense "cauliflower"	Avid enhancement with "Sunray" aspect
Leiomyosarcoma	Hypo- or isointense	Isointense	hyperintense	Nonspecific
Synovial sarcoma	Hypo- or isointense	Isointense	Slightly hyperintense	Heterogeneous enhancement
Lymphoma	Isointense	Hypo- or isointense	Slightly hyperintense	Heterogeneous enhancement
Rhabdomyosarcoma	Isointense	Isointense	Isointense	Heterogeneous enhancement

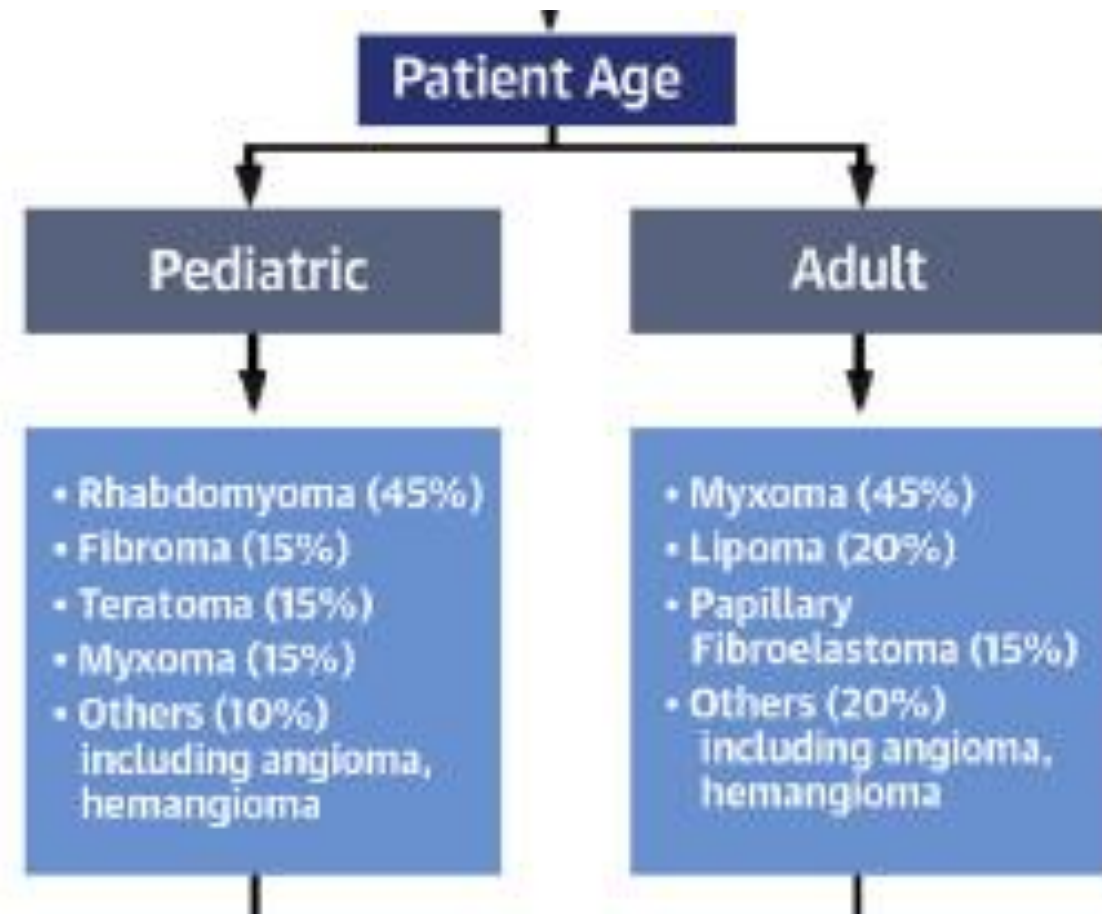
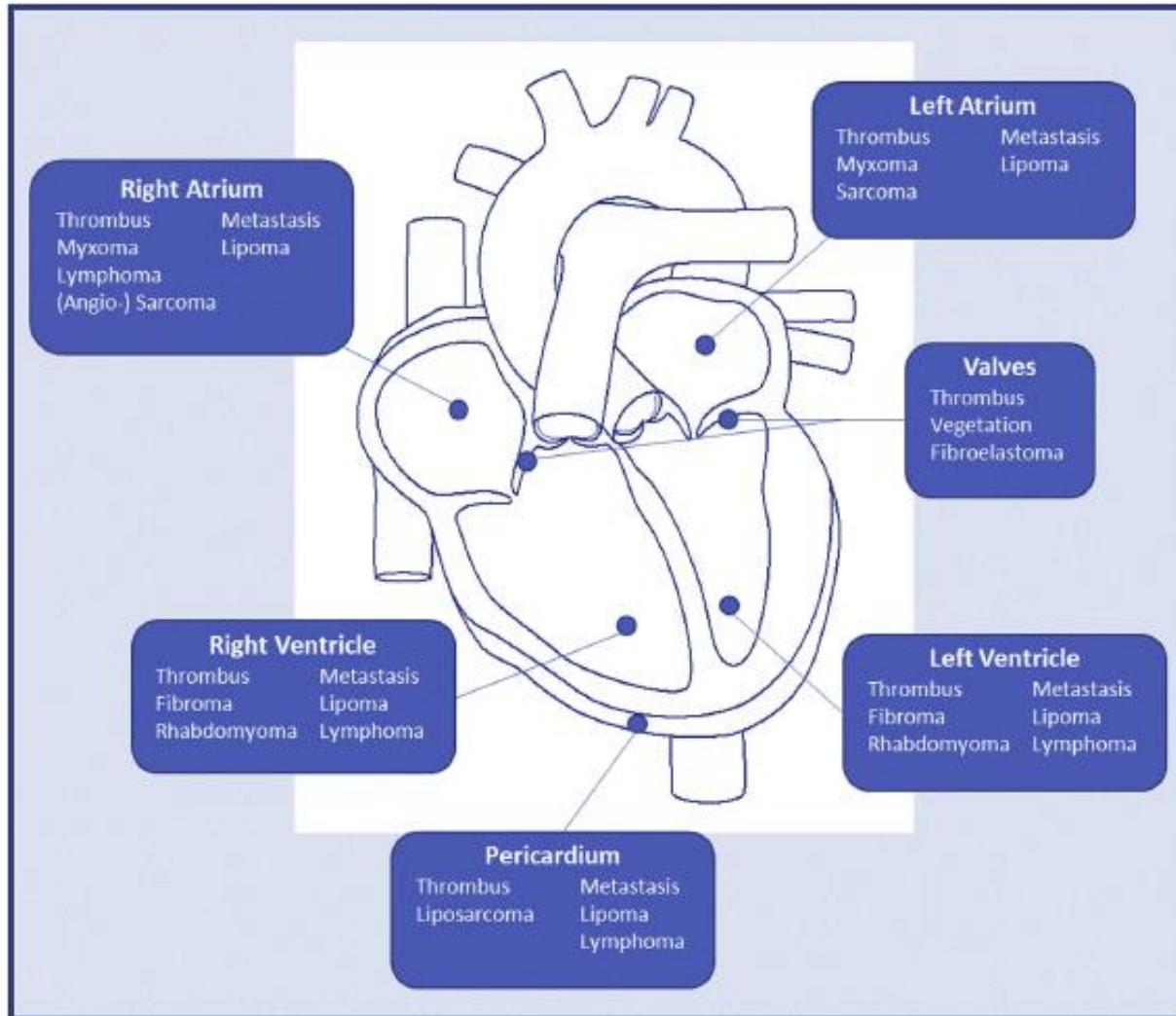
CMR, cardiac magnetic resonance; T1WI, T1-weighted imaging; T2WI, T2-weighted imaging; LGE, late gadolinium enhancement.

Cardiac magnetic resonance imaging of primary cardiac tumors

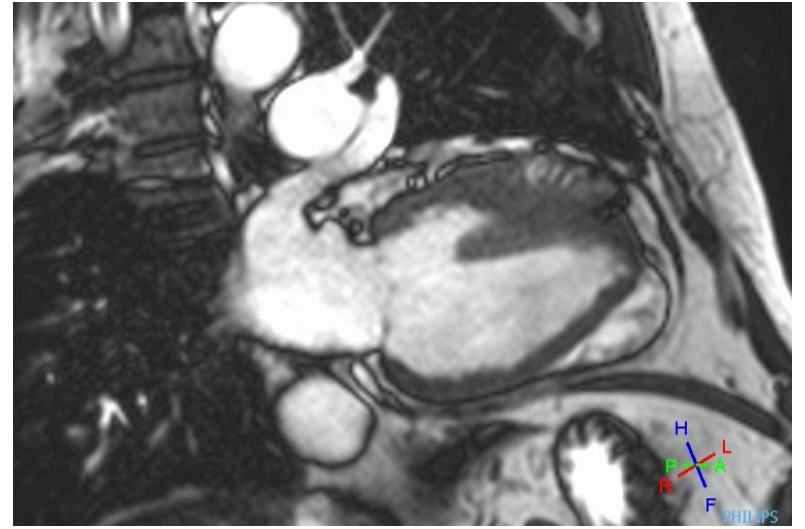
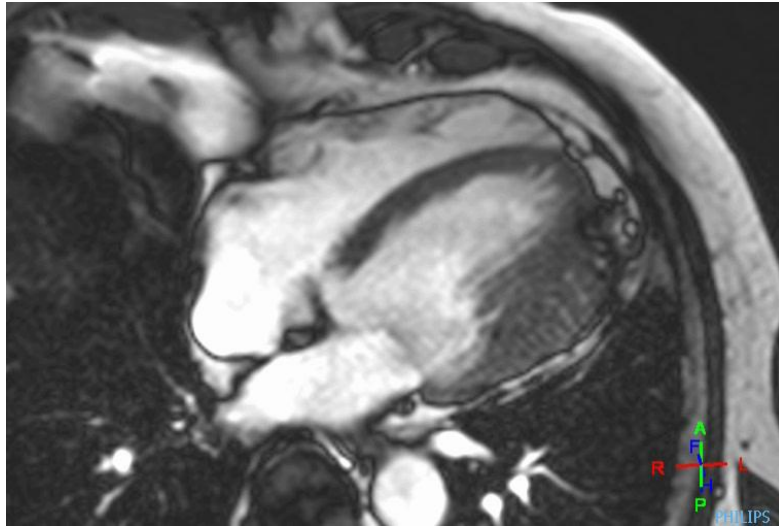
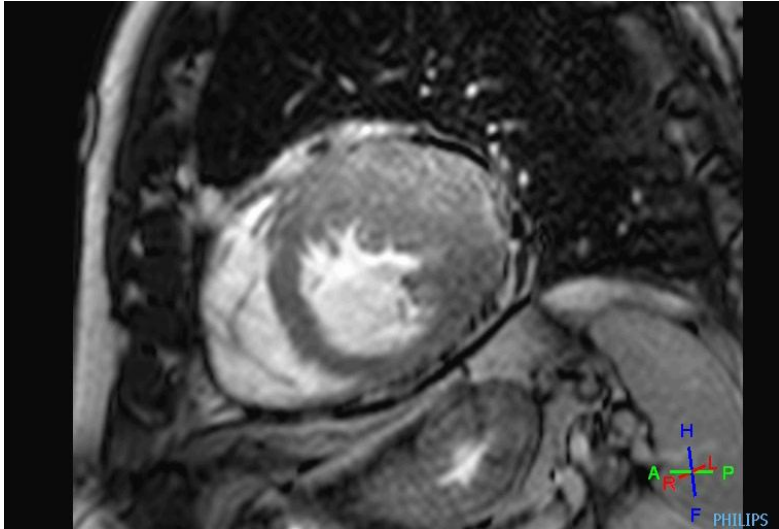
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¹Department of Radiology, Beijing Anshen Hospital, Capital Medical University, Beijing 100029, China; ²Discipline of Medical Radiation Sciences, School of Molecular and Life Sciences, Curtin University, Perth, Australia

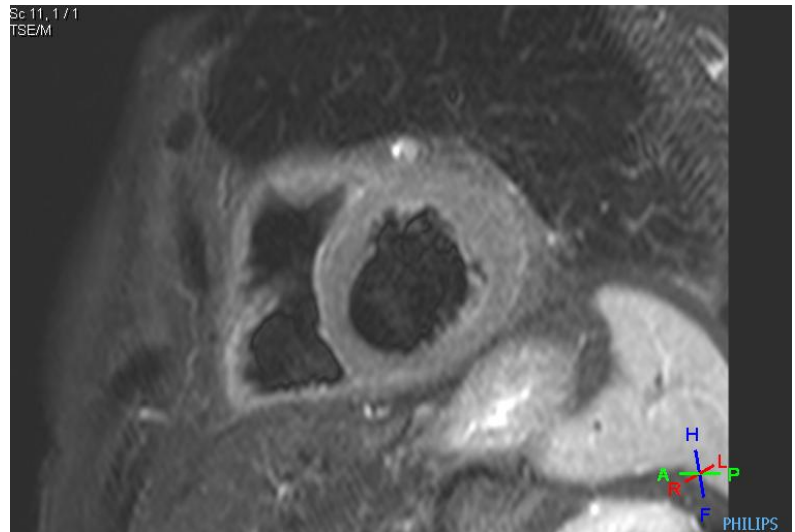
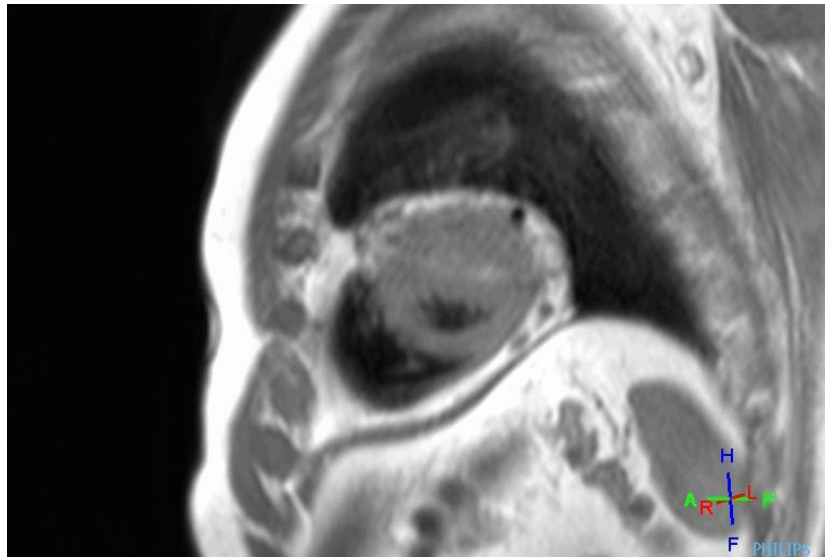
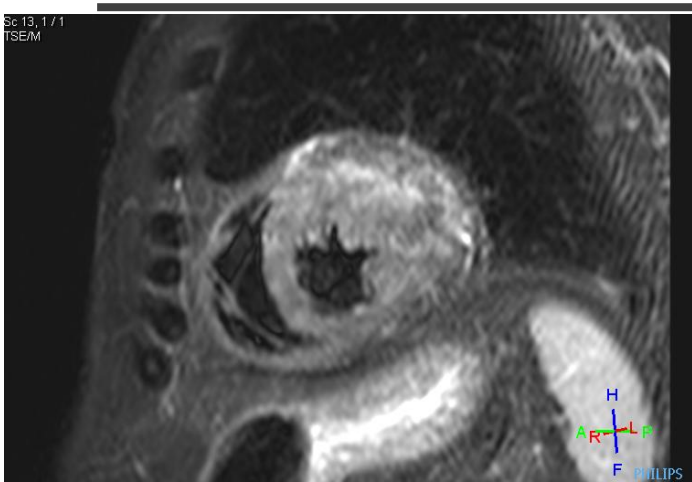
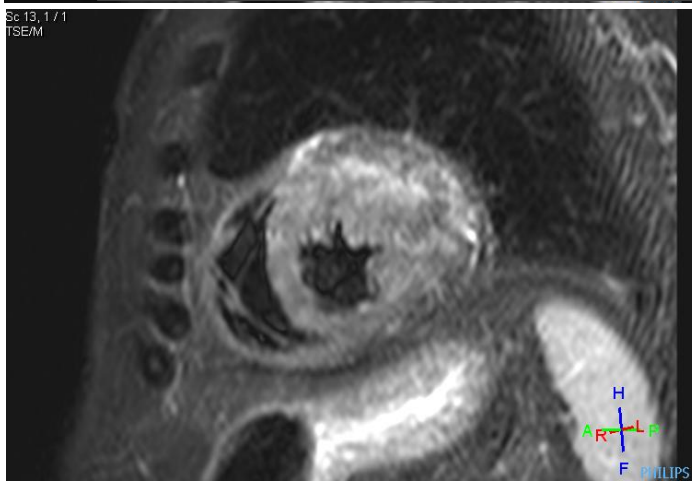
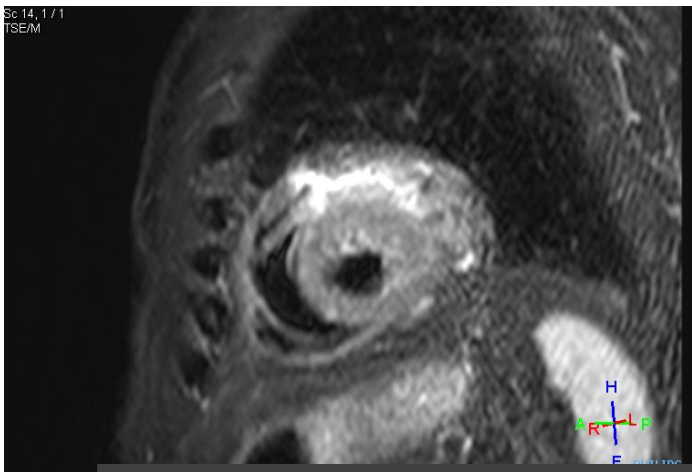
Correspondence to: Zhaoying Wen, Department of Radiology, Beijing Anshen Hospital, Capital Medical University, No. 2 Anshen Rd., Chaoyang District, Beijing 100029, China. Email: wenzhaoying11@163.com



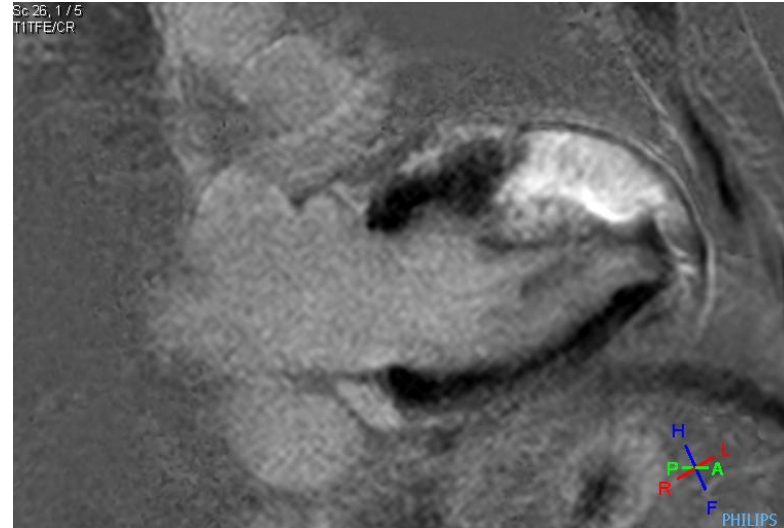
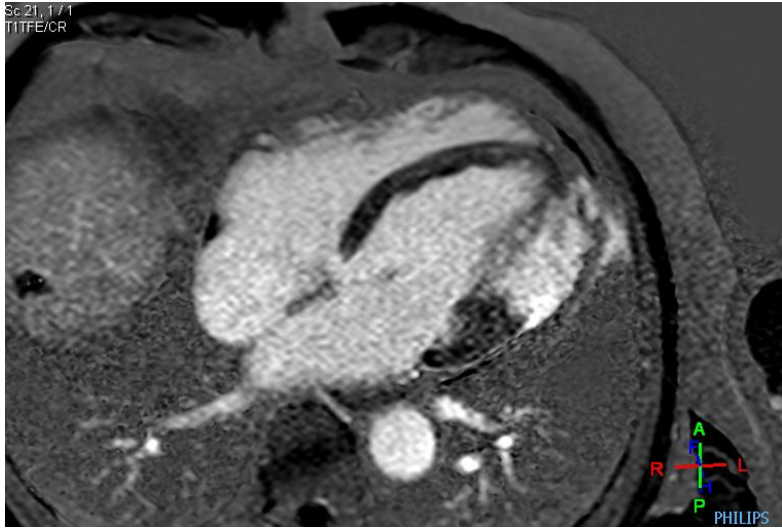
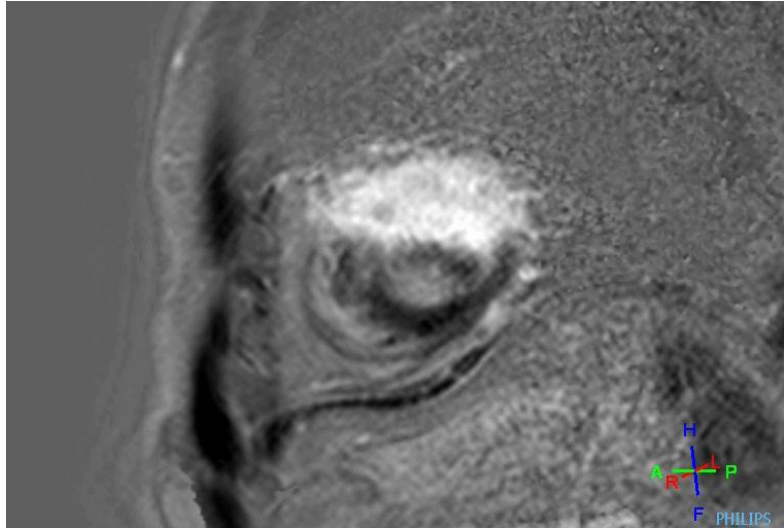
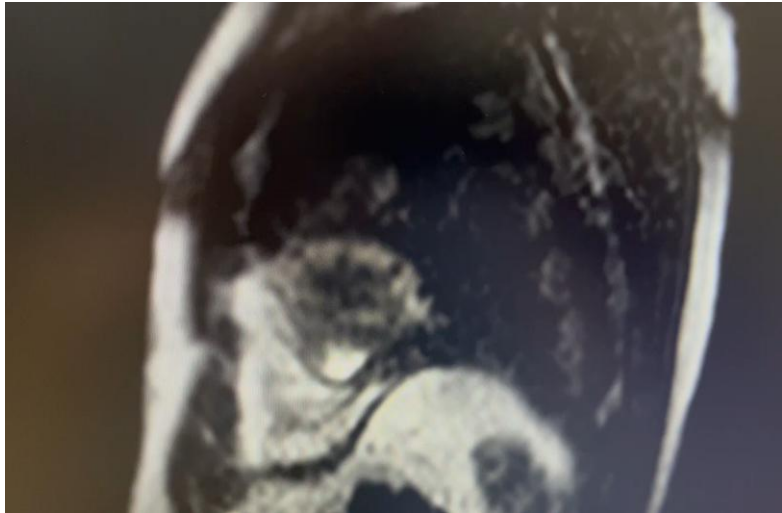
Hemangiom



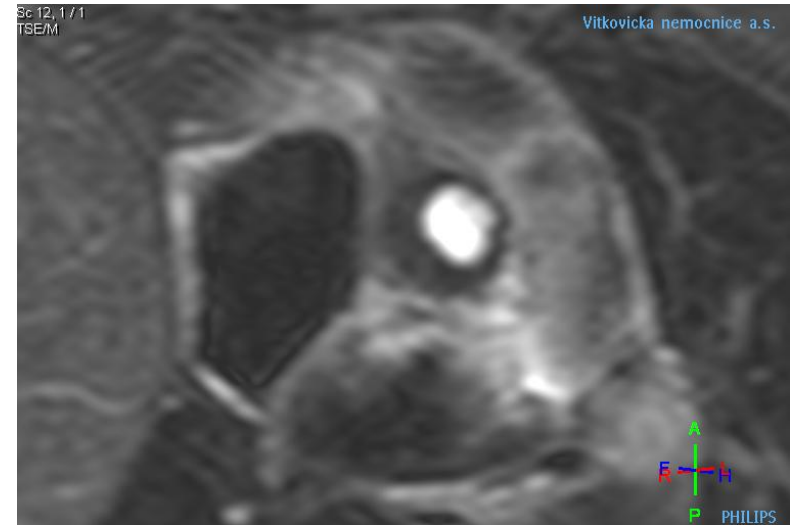
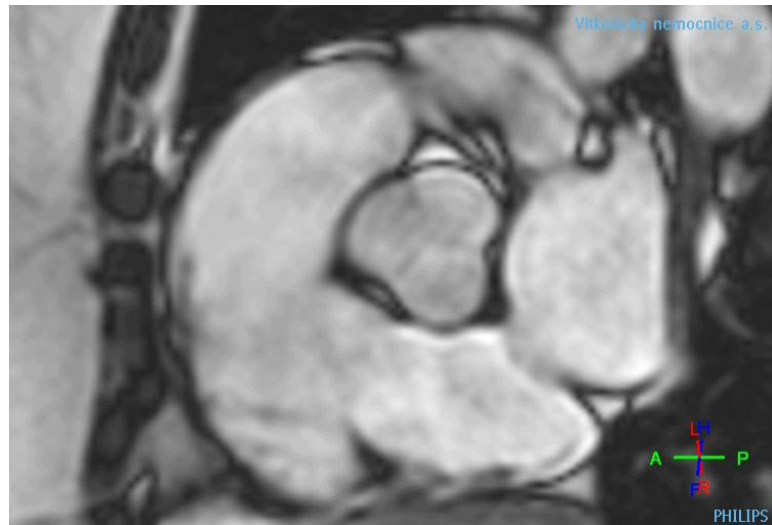
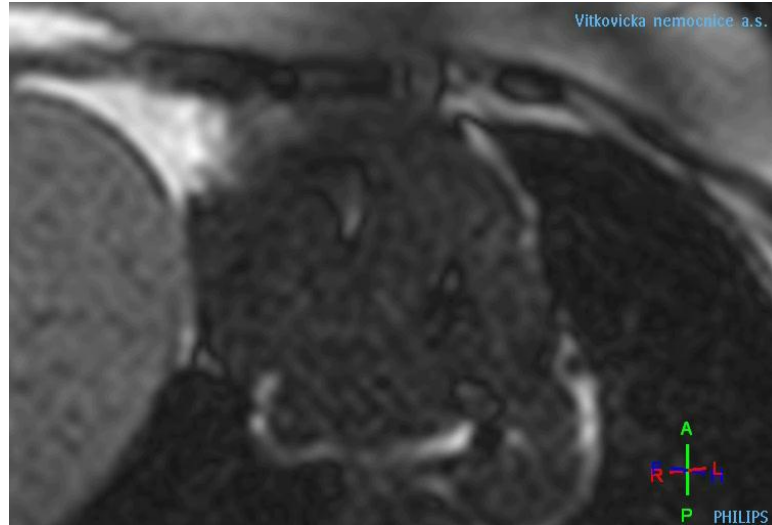
Hemangiom



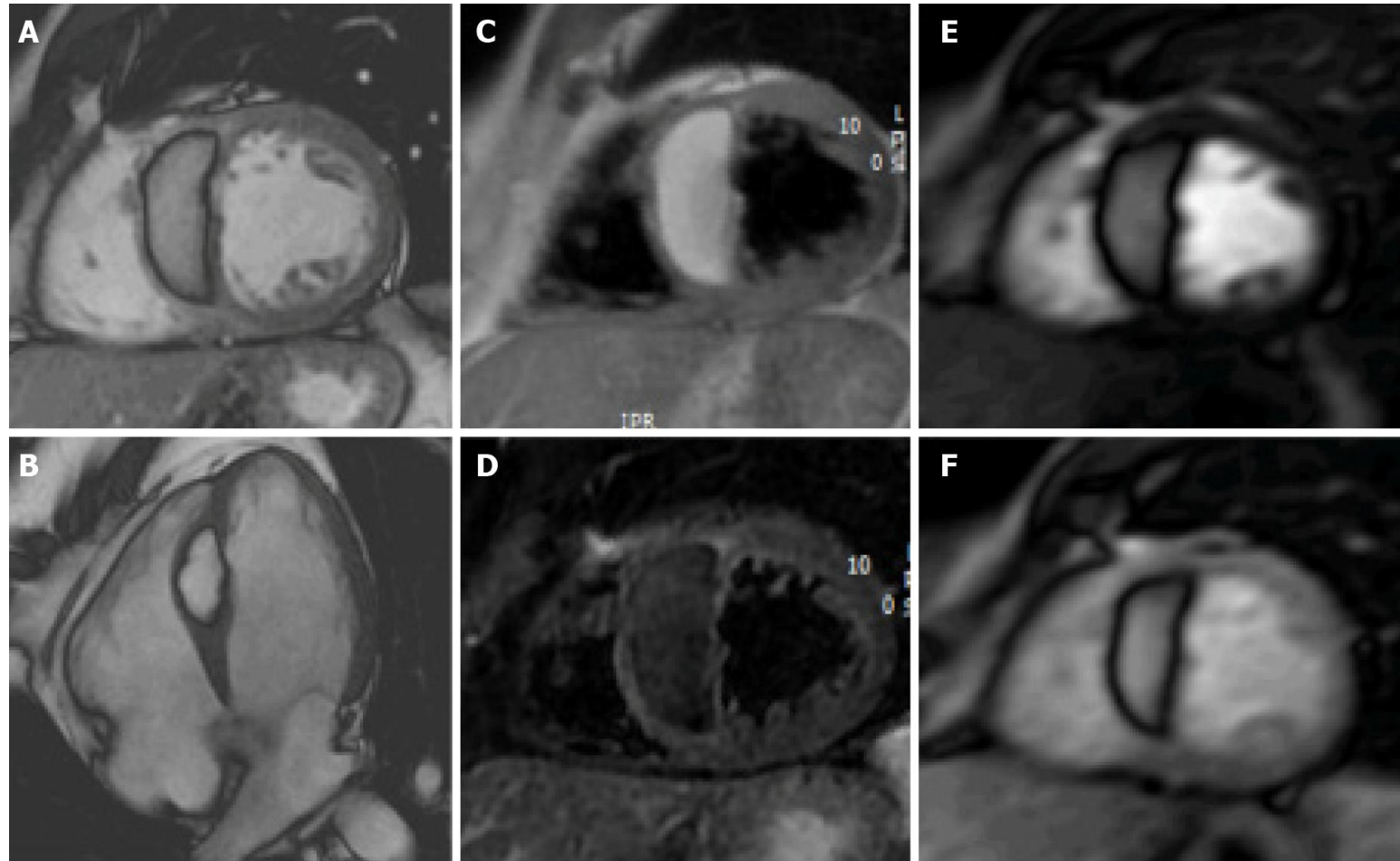
Hemangiom



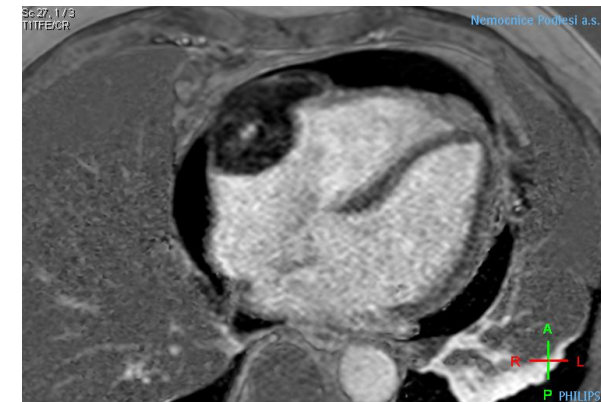
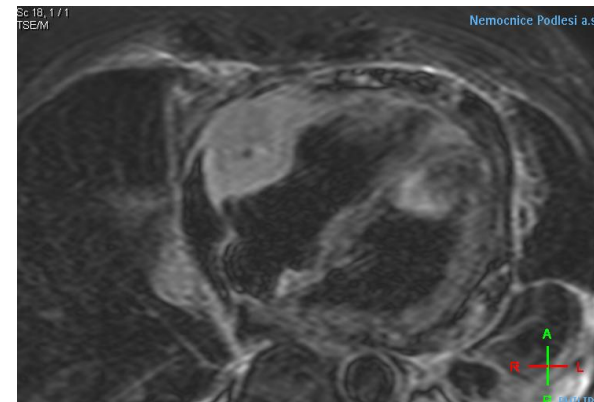
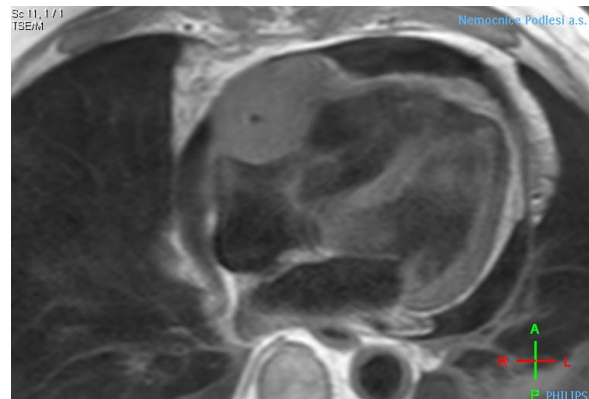
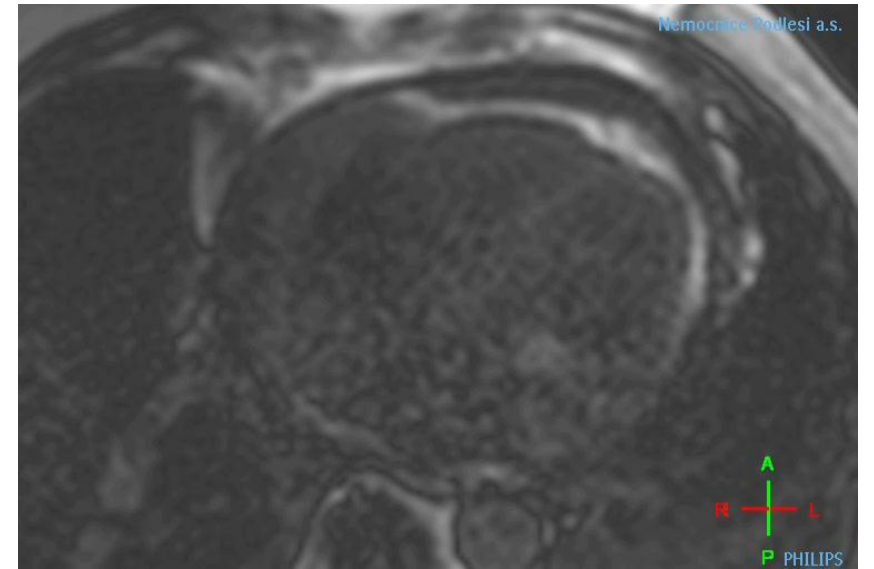
Myxom aortální chlopně



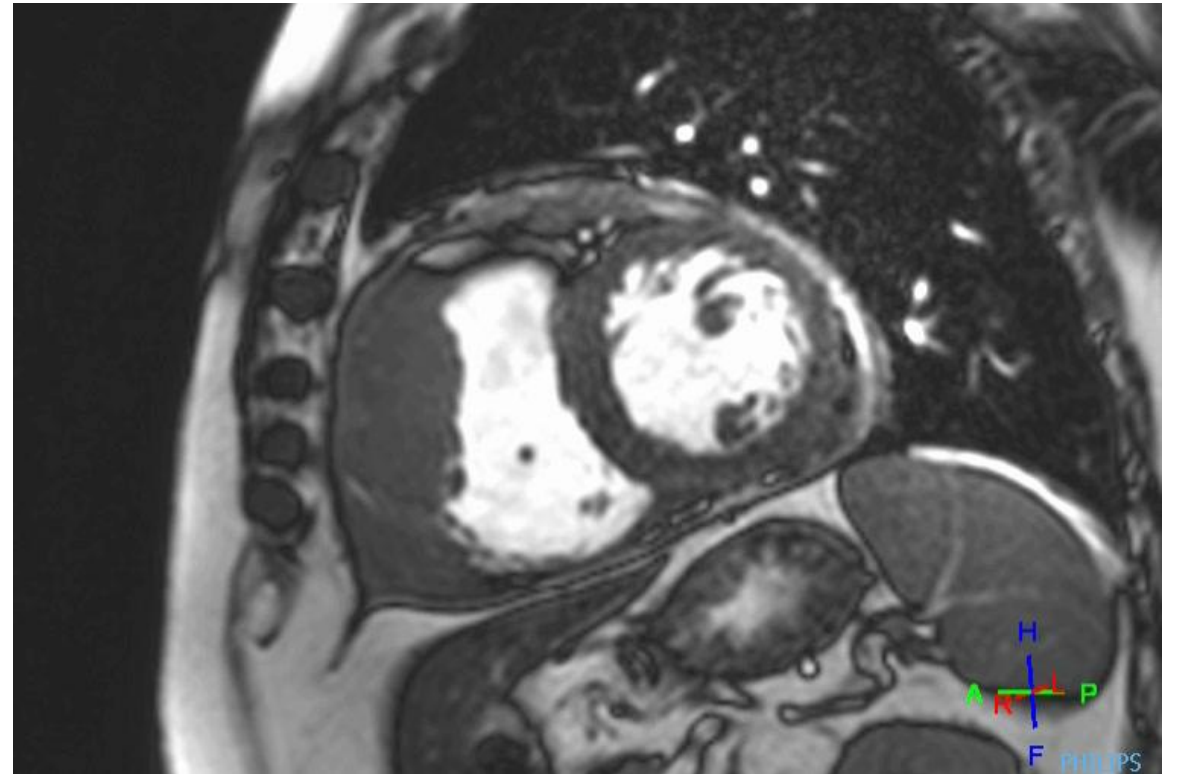
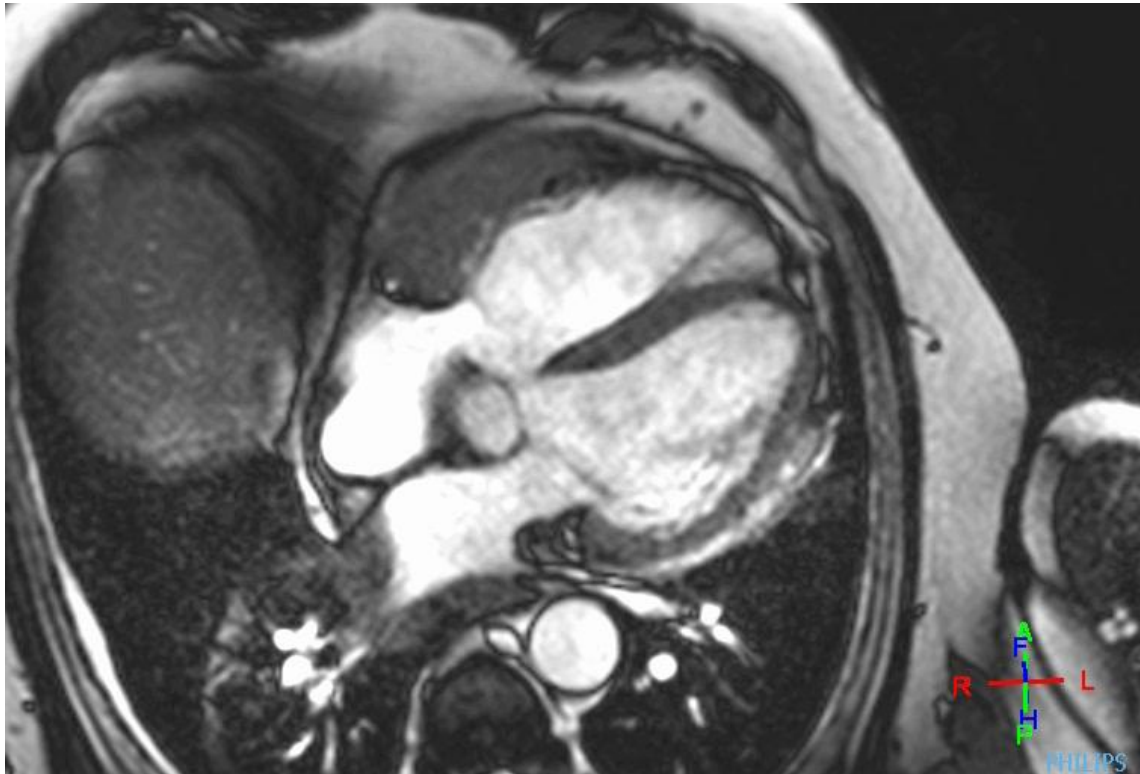
Lipom



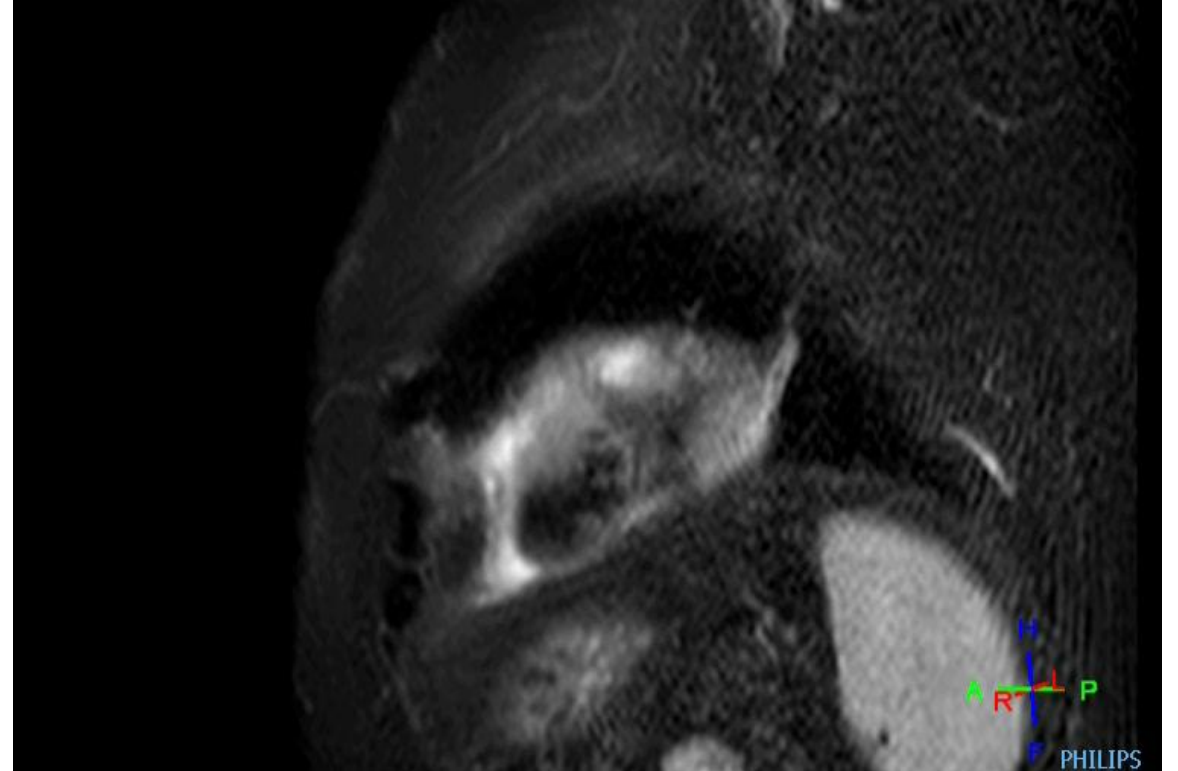
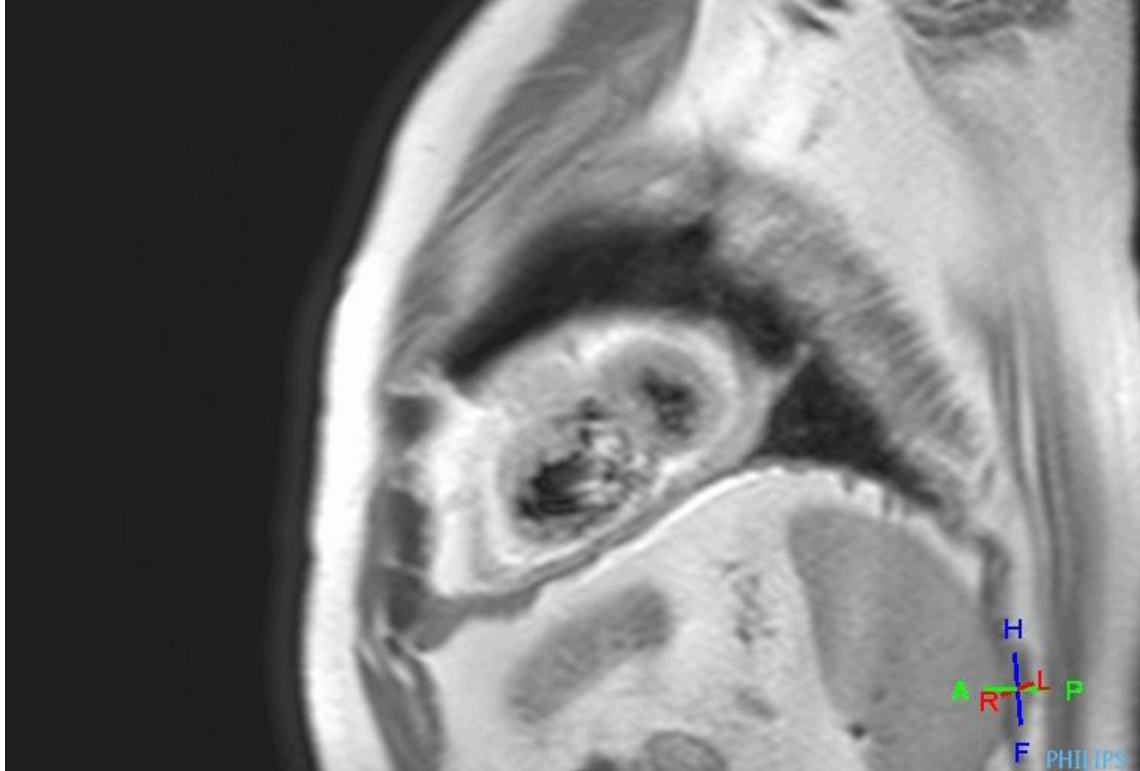
Lymfom



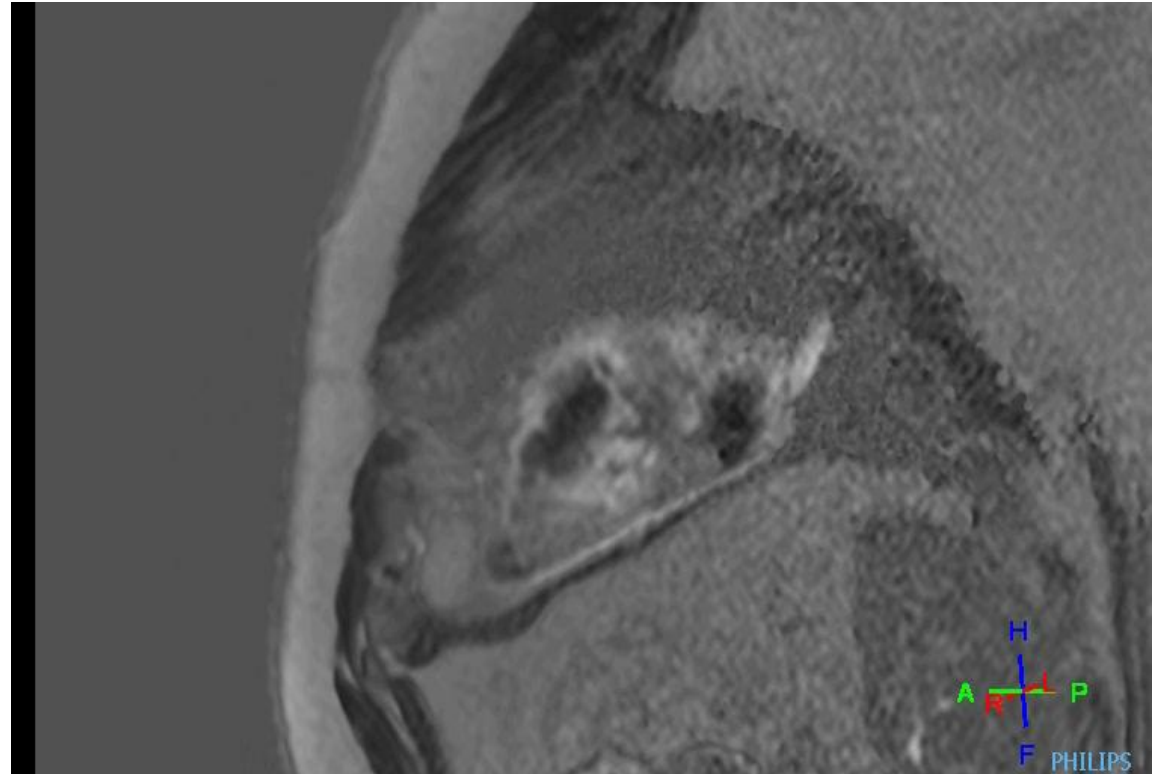
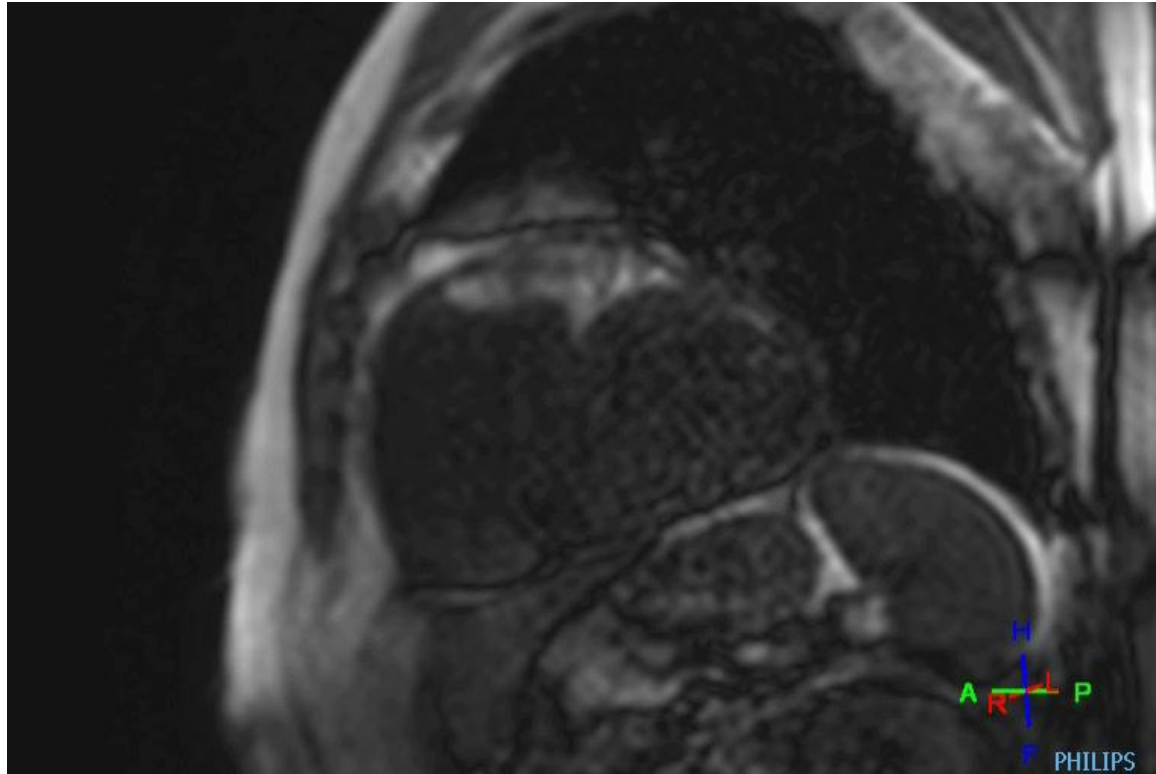
Sarkom



Sarkom



Sarkom



Sekundární (metastázy)

- prorůstání z okolí
- lymfogenní rozsev/šíření
- hematogenní rozsev/šíření
- intravaskulárně – prorůstáním z VCI nebo plicních žil
- prům. prevalence v autopsiích u pacientů s onkol. onem. – 9 %
- *u vícečetných MTS – 14 %, solitárně (pouze MTS srdce) 1,5 %*

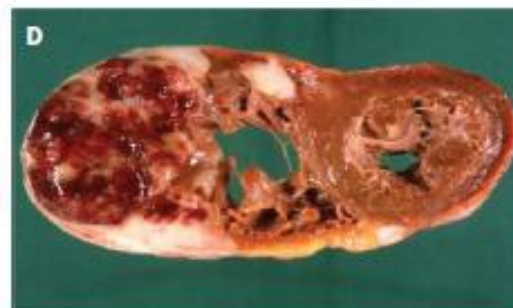
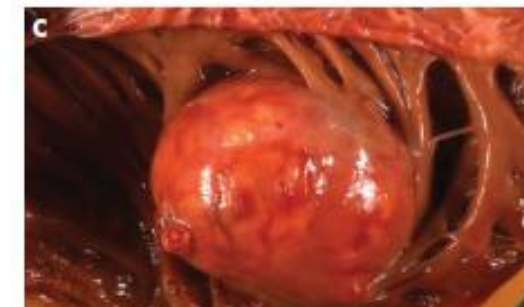
Table 1 Overview of the literature

Author, year of publication	Neoplasms (n)	Cardiac metastases, n (%)
Walther <i>et al</i> , 1948 ⁴	2027	46 (2.3)
Willis <i>et al</i> , 1952 ⁵	342	17 (4.9)
Hanfling <i>et al</i> , 1960 ⁶	694	127 (18.3)
Berge <i>et al</i> , 1968 ⁷	2595	122 (4.7)
Kline <i>et al</i> , 1972 ⁸	716	61 (8.5)
Karwinski <i>et al</i> , 1989 ⁹	2564	130 (5.1)
Mukai <i>et al</i> , 1988 ¹⁰	6240	953 (15.0)
Manojlovic <i>et al</i> , 1990 ¹¹	477	39 (8.2)
MacGee <i>et al</i> , 1991 ¹²	1311	57 (4.3)
Silvestri <i>et al</i> , 1997 ¹³	1928	162 (8.4)
Butany <i>et al</i> , 2005 ¹⁴	NA*	266 (2.3)*
Bussani <i>et al</i> (unpublished data)	7289	662 (9.1)

*Butany *et al*¹⁴ describe 266 cardiac neoplasms found among 11 432 consecutive autopsies.

Sekundární (metastázy)

- cca 2/3 perikard
- cca 1/3 myokard
- 5 % endokard

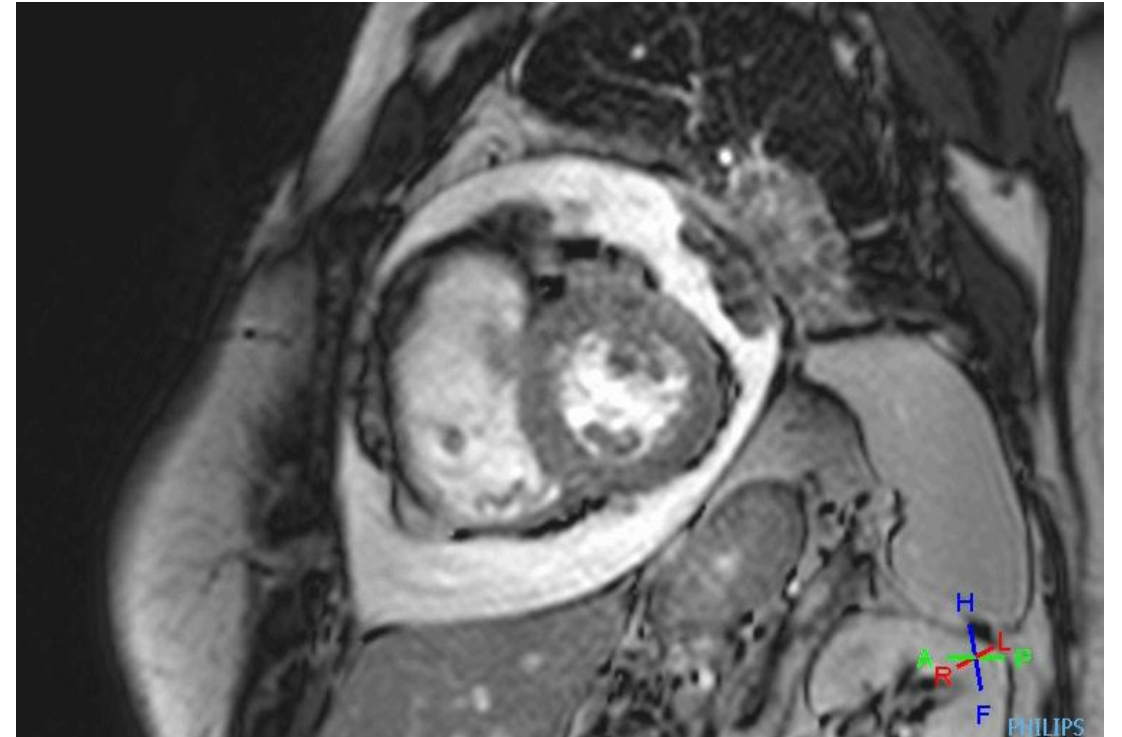
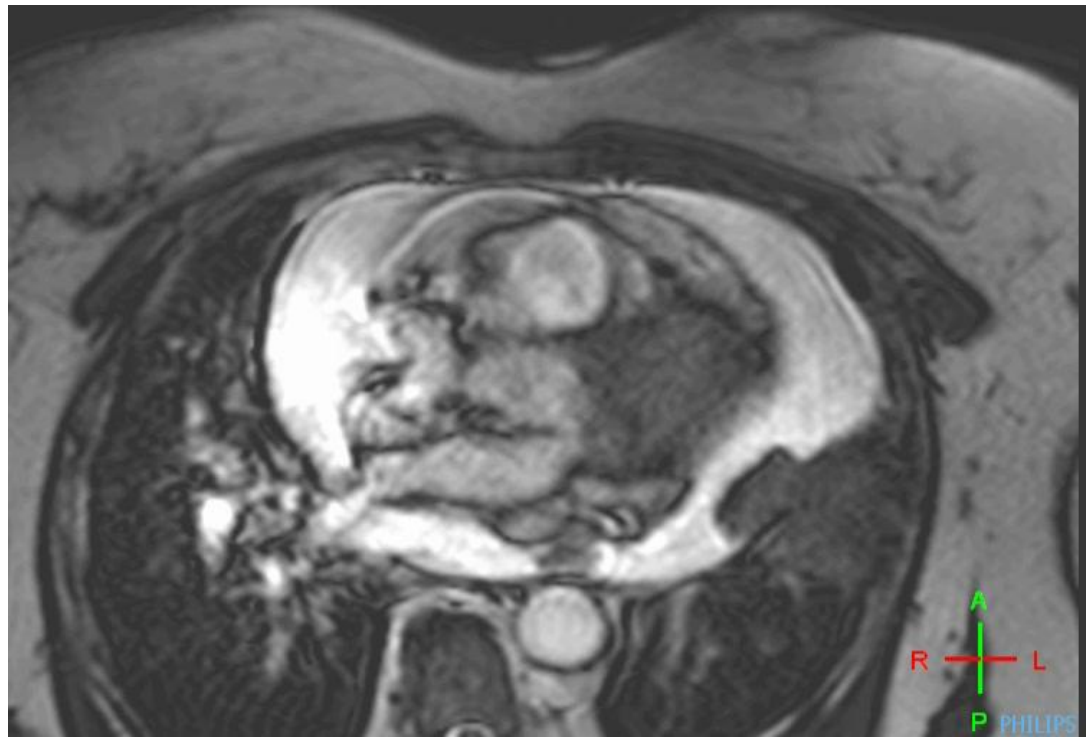


REVIEW

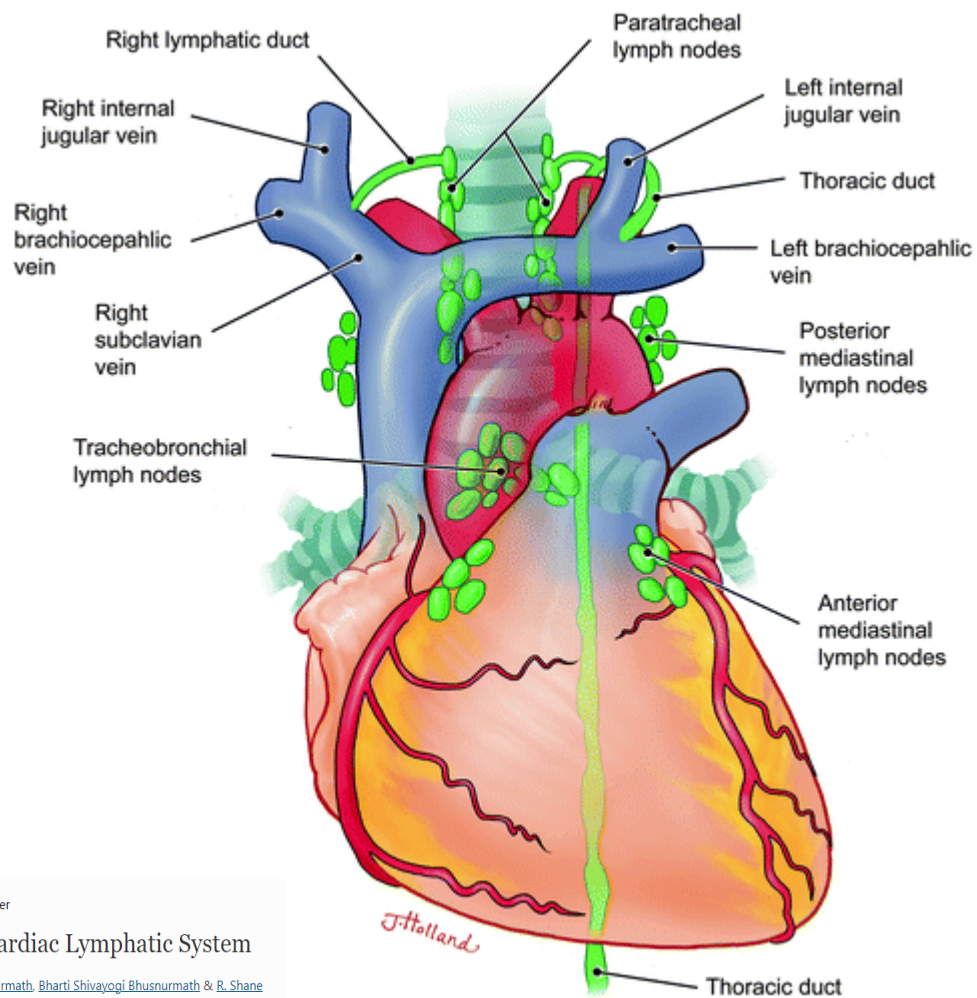
Cardiac metastases

R Bussani, F De-Giorgio, A Abbate, F Silvestri

Prorůstání tumoru do perikardu



Lymfatický systém



REVIEW

Cardiac metastases

R Bussani, F De-Giorgio, A Abbate, F Silvestri

J Clin Pathol 2007;60:27–34. doi: 10.1136/jcp.2005.035105



Home > The Cardiac Lymphatic System > Chapter

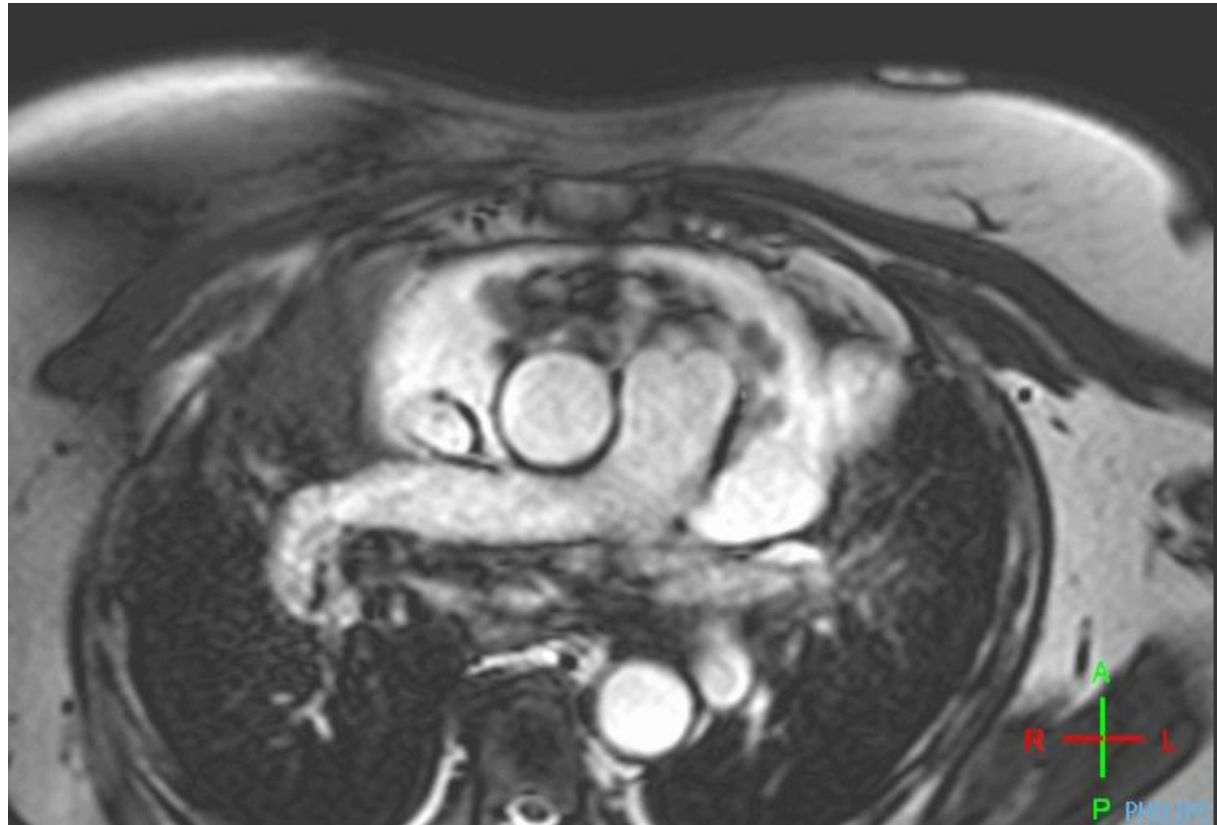
A General Outline of the Cardiac Lymphatic System

Marios Loukas, Sameer Shah, Shivayogi Bhusnurmath, Bharti Shivayogi Bhusnurmath & R. Shane Tubbs

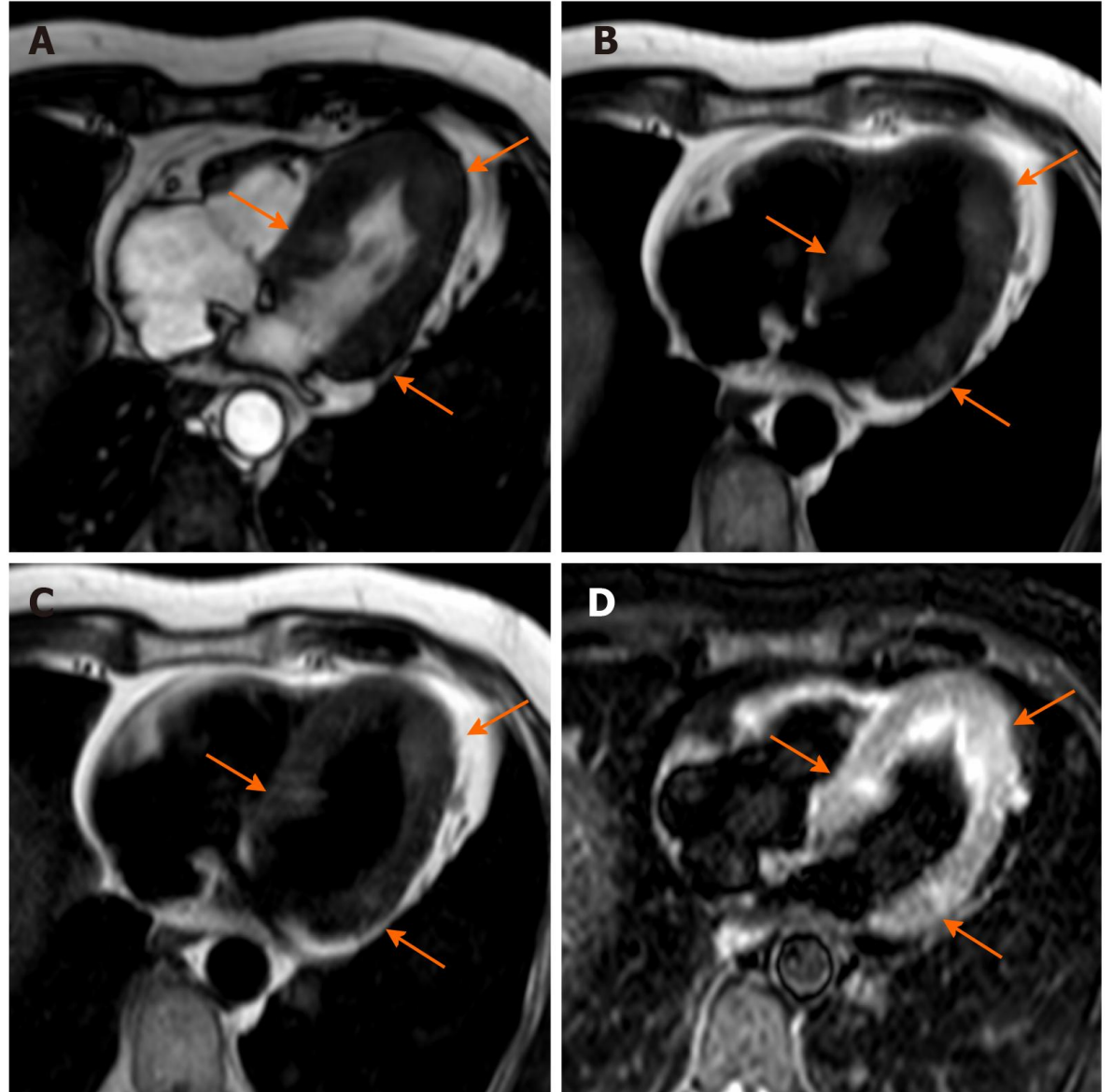
Chapter | First Online: 01 January 2013

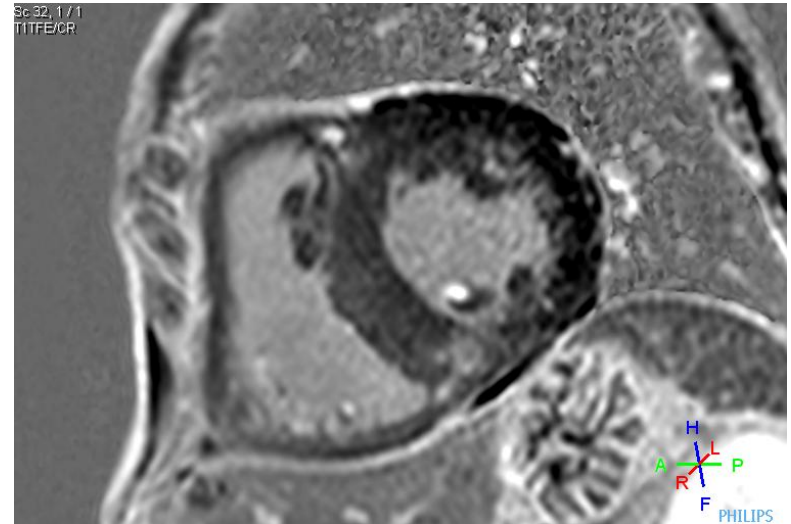
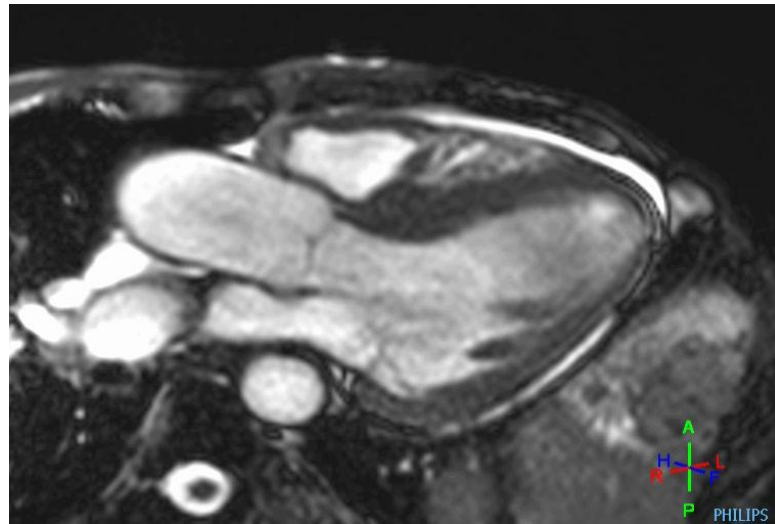
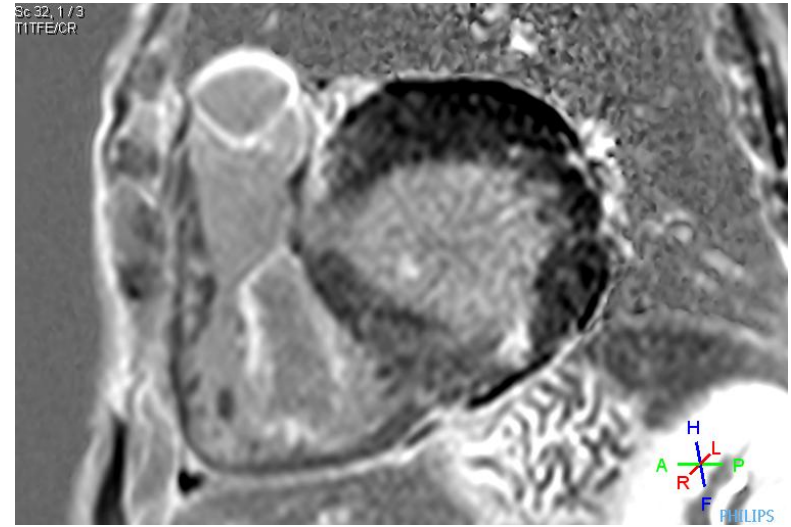
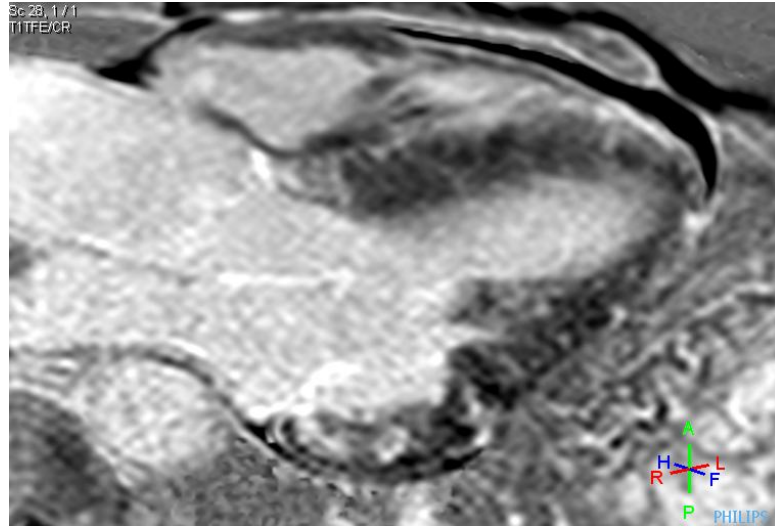
1395 Accesses

Lymfogenní šíření metastáz

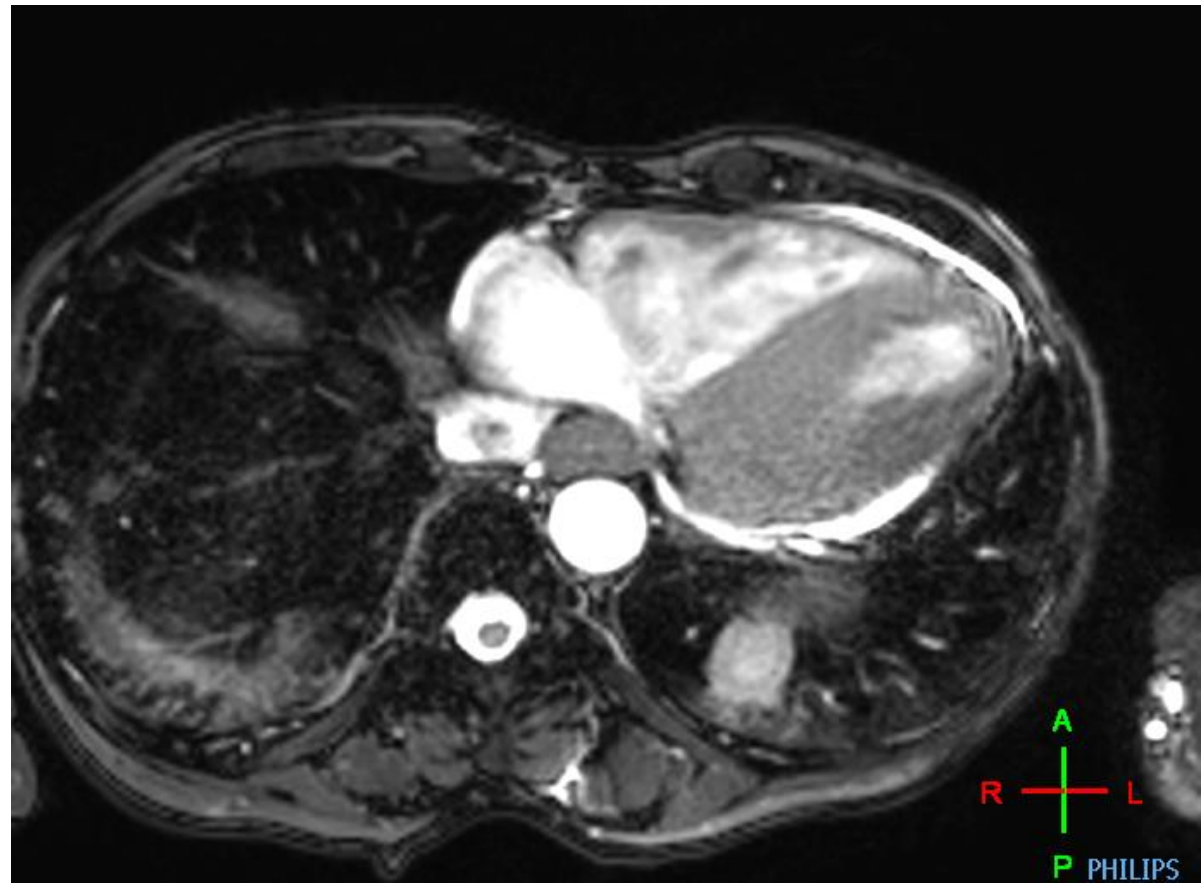
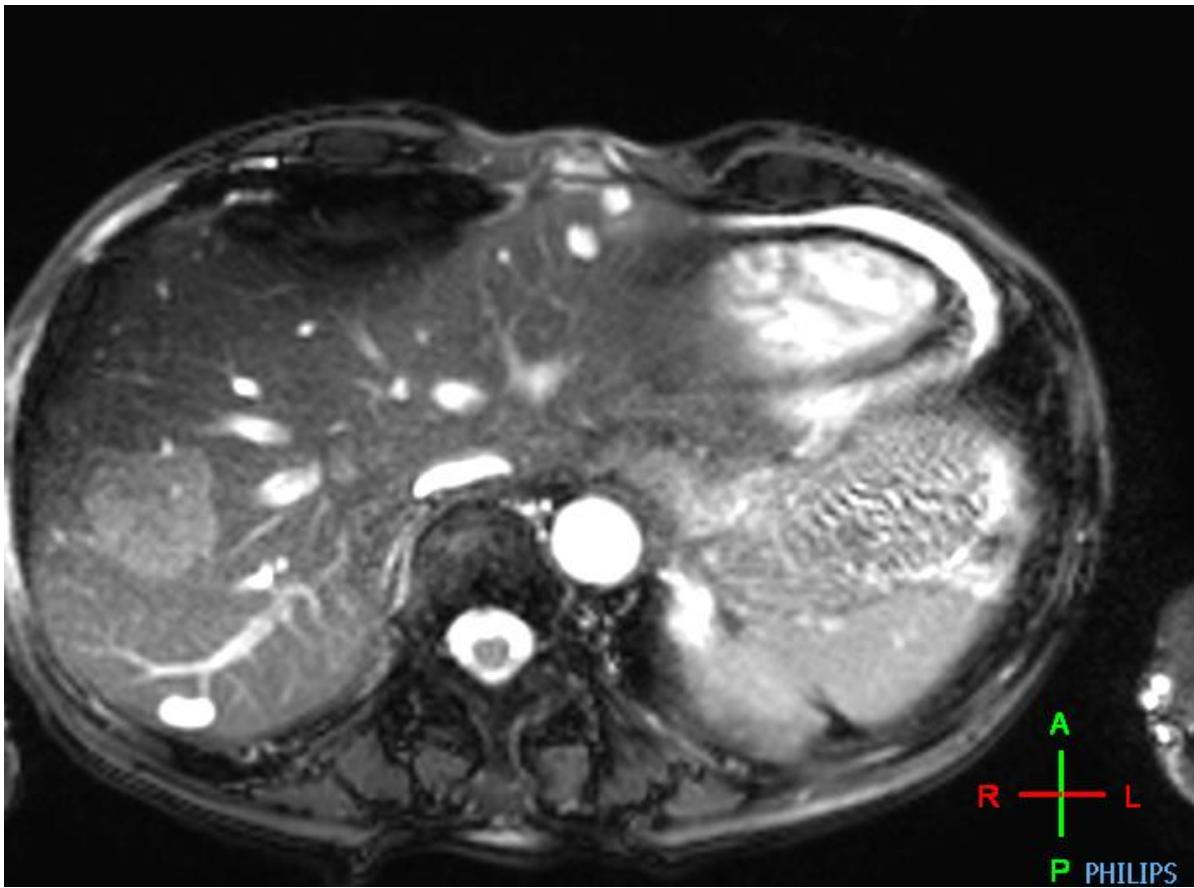


Hematogenní - melanom





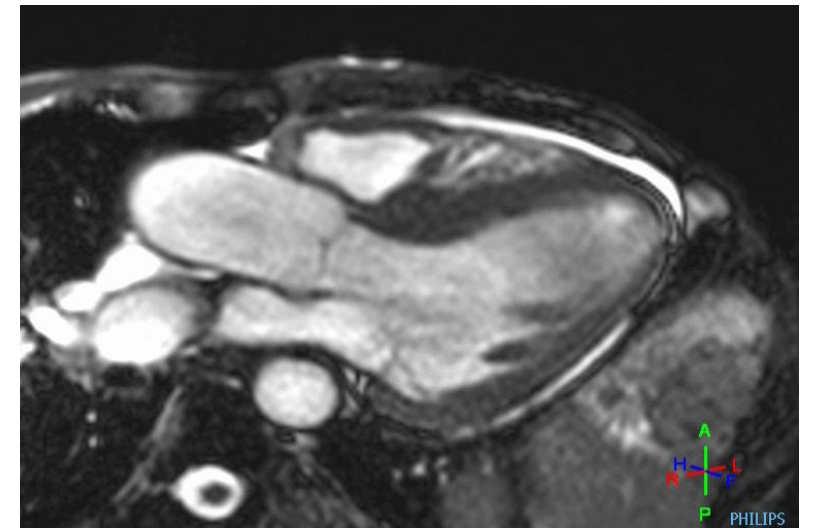
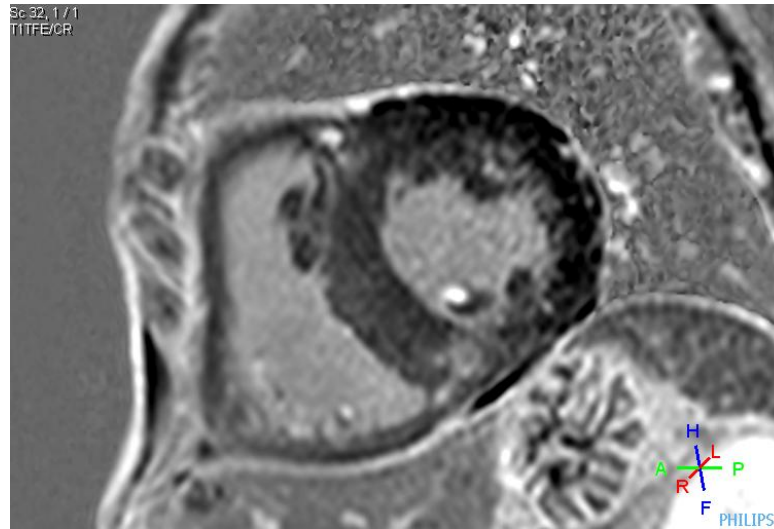
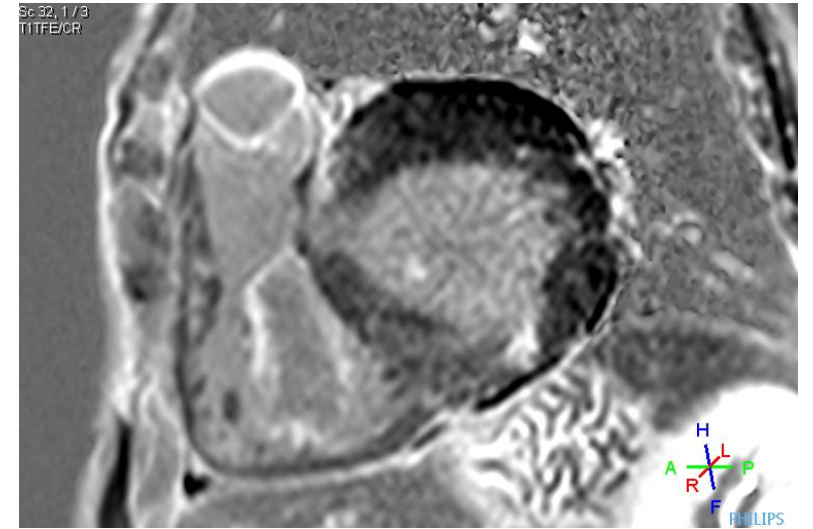
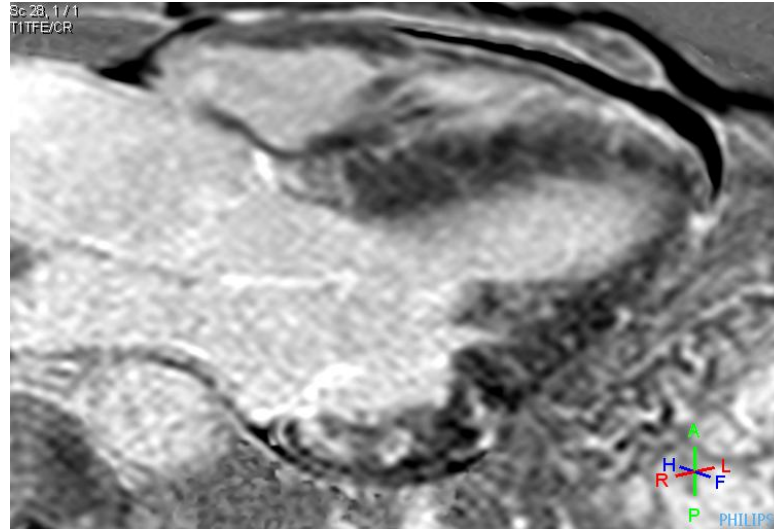
Ložiska fibrózy?



Tumor jater a plic



Metastázy?



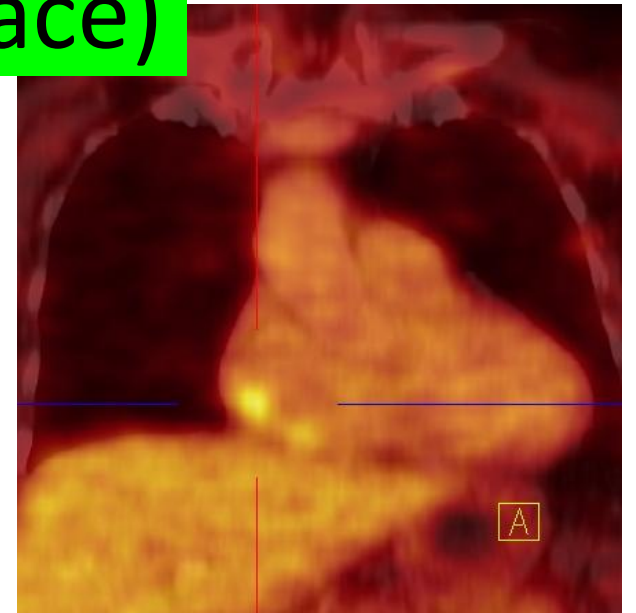
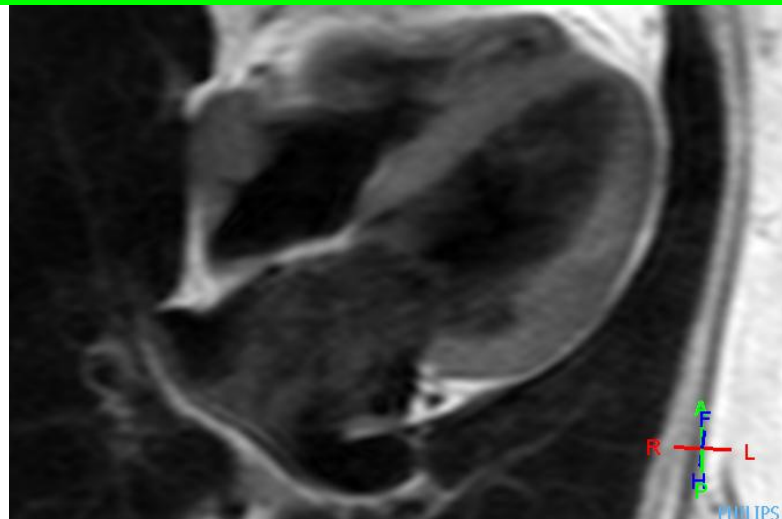
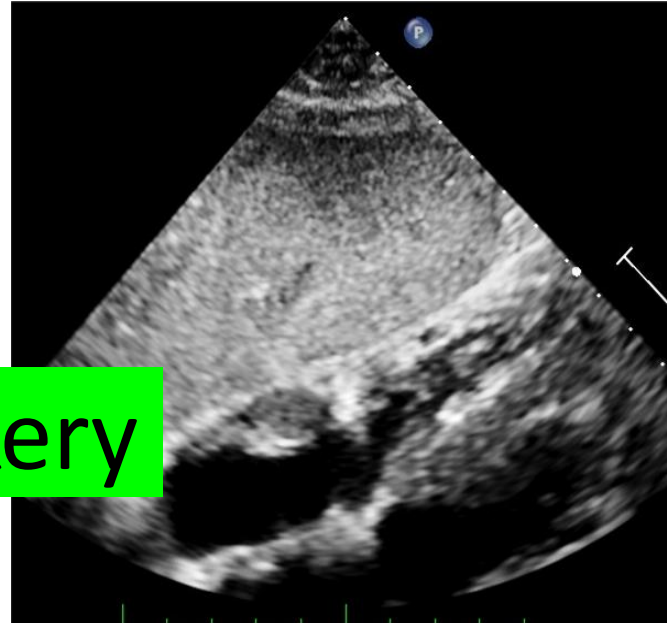
adenokarcinom pankreatobiliárneho typu s mts do jater, peritonea a plic

Tumory srdce

- ECHO
- CT
- MRI
- FDG PET/CT

tumor markery
histologie

reakce na léčbu (antikoagulace)



Multimodalitní
zobrazení

Závěr

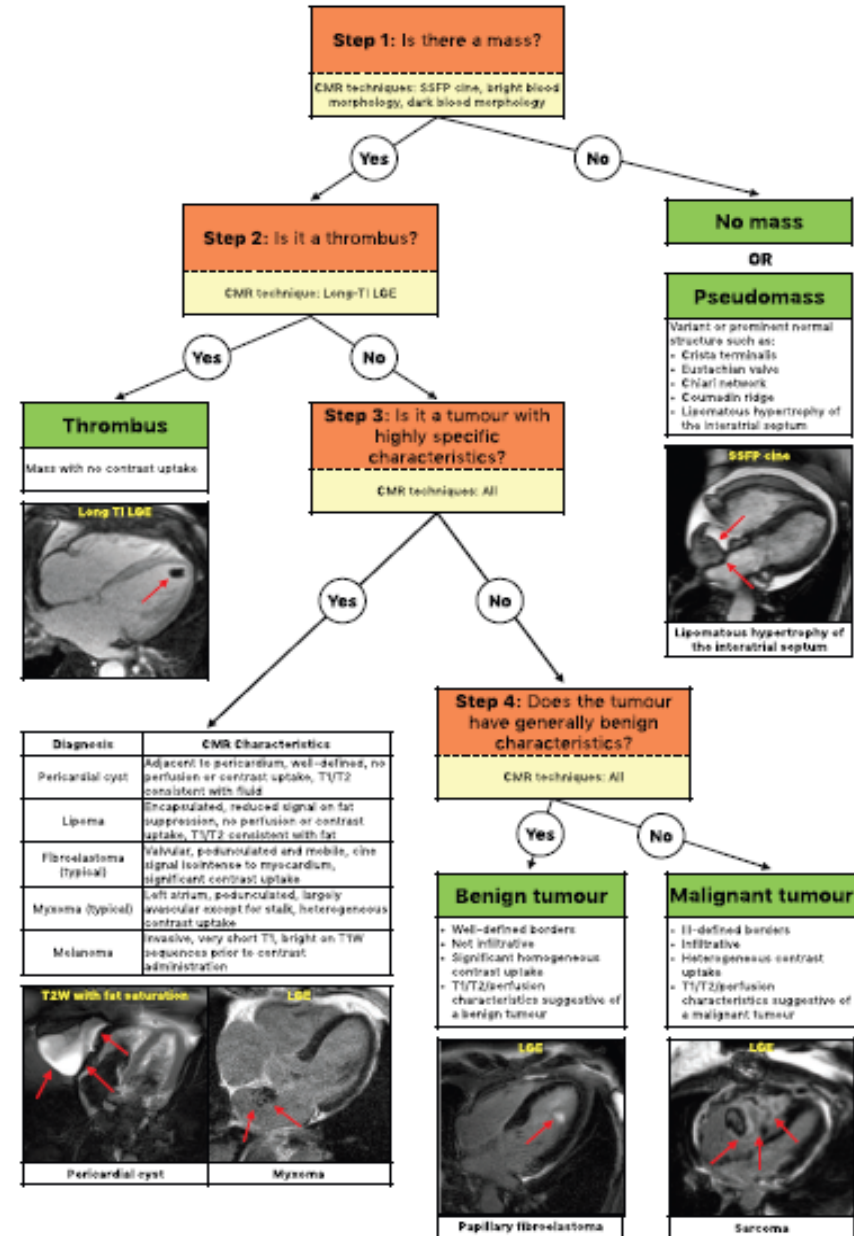


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CLINICAL RESEARCH
Cardiac and vascular surgery

Cardiovascular magnetic resonance imaging in suspected cardiac tumour: a multicentre outcomes study

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Děkuji za pozornost