VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

1. LÉKAŘSKÁ FAKULTA Univerzita Karlova

RETROSPEKTIVNÍ HODNOCENÍ INCIDENCE ATRIÁLNÍ FUNKČNÍ MITRÁLNÍ REGURGITACE (AFMR) V ZÁVISLOSTI NA PŘÍTOMNÉ DILATACI LEVÉ SÍNĚ

Alena Večeřová, Štěpán Havránek, Aleš Linhart

Brno

5. 5. 2024

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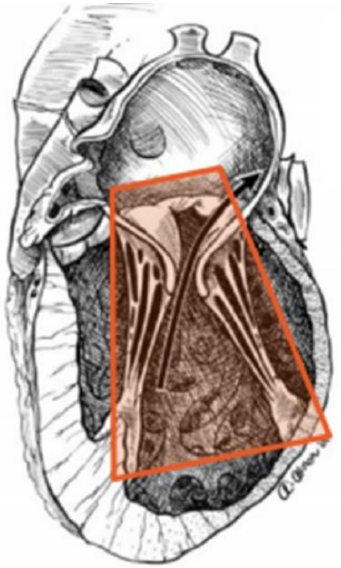
ATRIÁLNÍ FUNKČNÍ MITRÁLNÍ REGURGITA

- Vzniká druhotně při dilataci a onemocnění levé síně
- Dilatace mitrálního anulu
- Primárně jsou cípy mitrální chlopně intaktní
- Typicky v podmínkách permanentní fibrilace síní
- Bez dilatace levé komory



Pepe, Martino et al. "Functional Mitral Regurgitation: If the Myocardium Is Guilty Do We Also Need to 'Rehabilitate' the Valve?" *EMJ Cardiology* (2015): n. pag.

ATRIÁLNÍ FUNKČNÍ MITRÁLNÍ REGURGITACE

- Tvoří 25% všech středně významných mitrálních regurgitací[1)]
  - Rizikové faktory
    - Věk
    - Ženské pohlaví
    - Fibrilace síní/dilatace levé síně
  - Má nízké riziko dysfunkce levé komory
    - Při správné léčbě AFMR regreduje

[1)] Dziadzko V, Dziadzko M, Medina-Inojosa JR, Benfari G, Michelena HI, Crestanello JA, Maalouf J, Thapa P, Enriquez-Sarano M. Causes and mechanisms of isolated mitral regurgitation in the community: clinical context and outcome. Eur Heart J. 2019 Jul 14;40(27):2194-2202. doi: 10.1093/eurheartj/ehz314. PMID: 31121021.

RETROSPEKTIVNÍ HODNOCENÍ PROVEDENÝCH ECHOKARDIOGRAFICKÝCH VYŠETŘENÍ MEZI ROKY 2008 A 2013 A ZA NÁSLEDUJÍCÍCH DESET LET MEZI ROKY 2018 A 2023

- Neselektovaná echokardiografická vyšetření
- Splněna podmínka dilatace levé síně
- Vyloučeny byly echokardiografické studie se středně významnou a významnou mitrální regurgitací a mitrální stenózou jakékoliv etiologie

INCLUSION CRITERIA

- **Rozměr levé síně PLAX > 45 mm a/nebo LAVI > 34 ml/m^2**

EXCLUSION CRITERIA

- Primární mitrální regurgitace
- Středně těžká nebo těžká mitrální regurgitace jakékoliv etiologie
- Systolická dysfunkce levé komory s EF pod 50%
- HKMP, DKMP
- Myokard s lokálními poruchami kinetiky levé komory
- Jiná těžká chlopenní vada levého i pravého srdce
- Středně významná a významná plicní hypertenze

ECHOLABORATOŘ 2. INTERNÍ KLINIKY

2008-2013

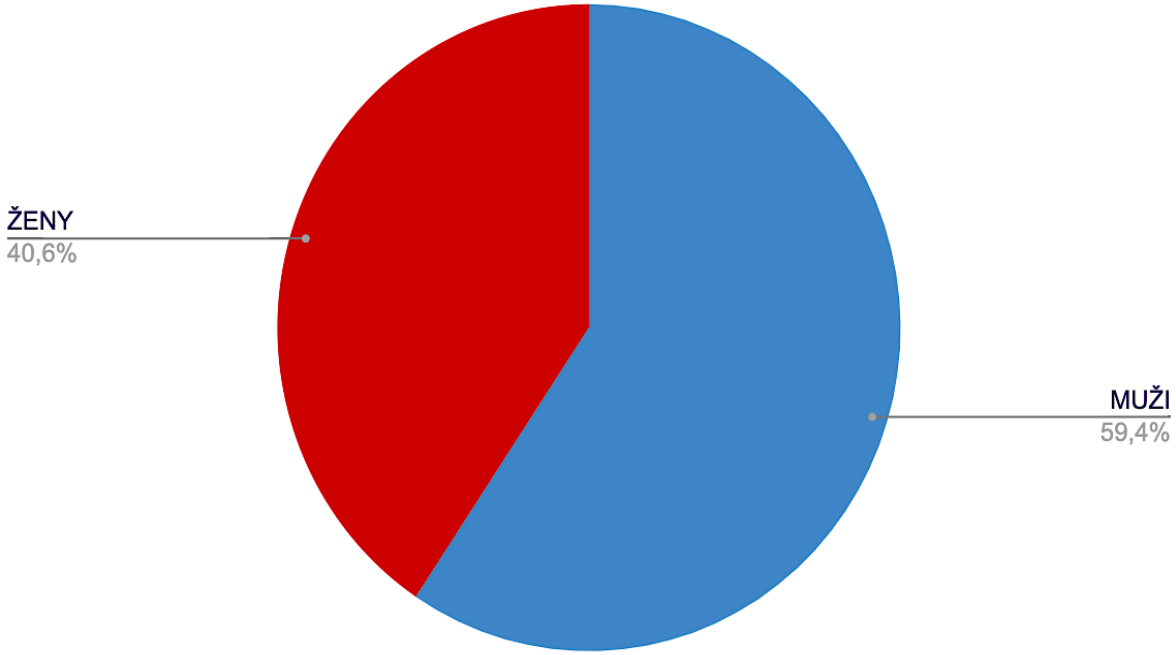
- **57 366** echokardiografických vyšetření
- **2 349** (4,09%) pacientů mělo dilatovanou levou síň

2018-2023

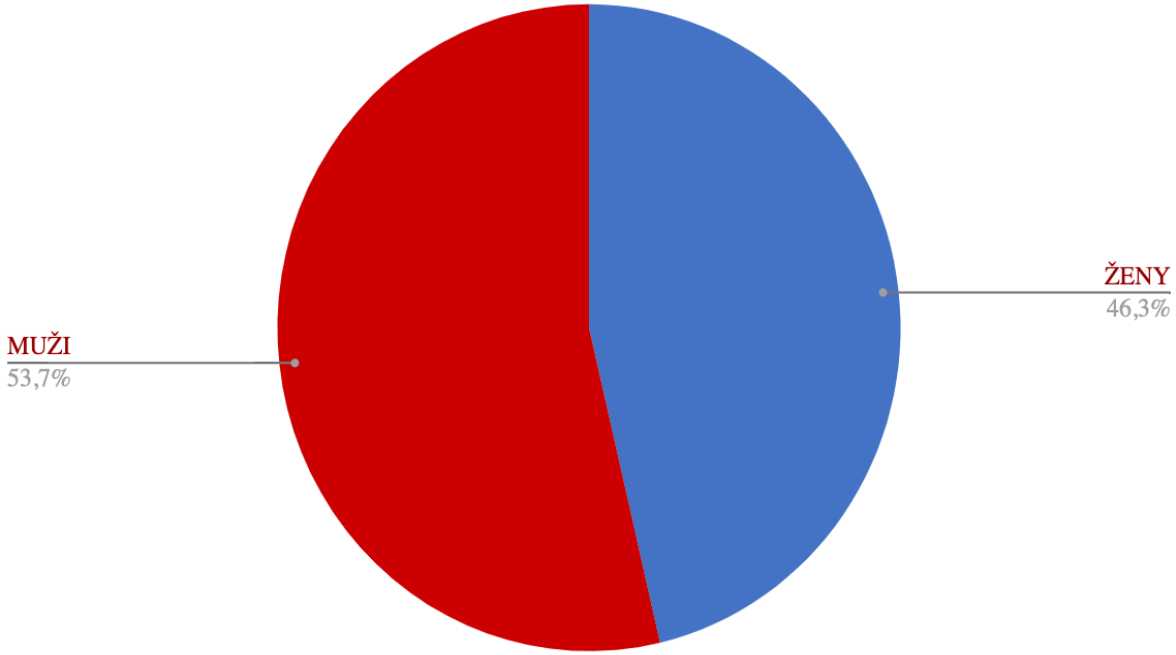
- **2 349** pacientů s dilatací levé síně
  - **336** (14,3%) pacientů mělo středně významnou nebo významnou regurgitaci
  - **117** (4,6 %) pacientů mělo významnou regurgitaci 117 pacientů

ROZLOŽENÍ POHLAVÍ

Rozložení pohlaví u pacientů s dilatovanou levou síní



Rozložení pohlaví u pacientů s významnou AFMR



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2 349 pacientů/ (4,09%)

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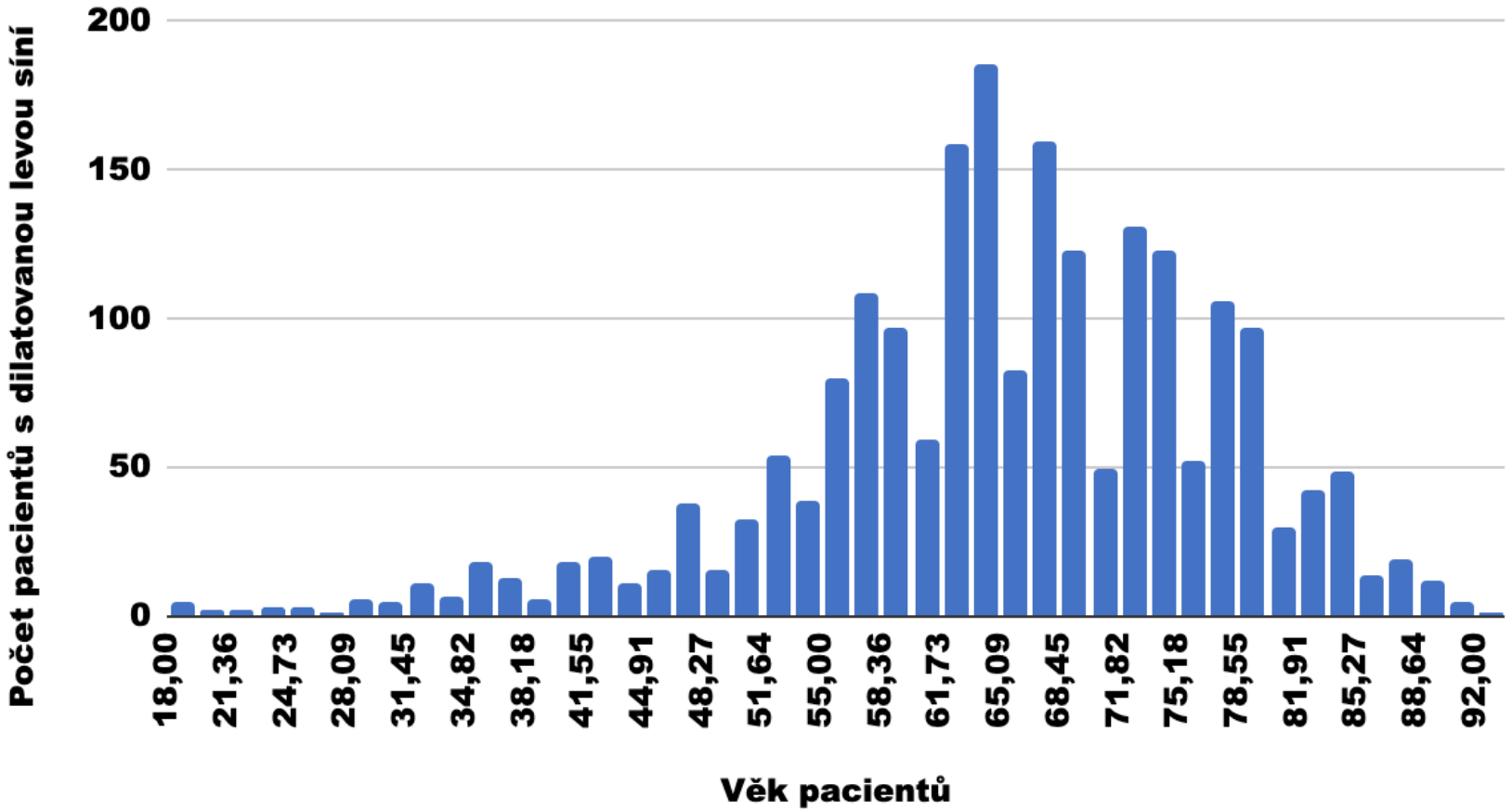
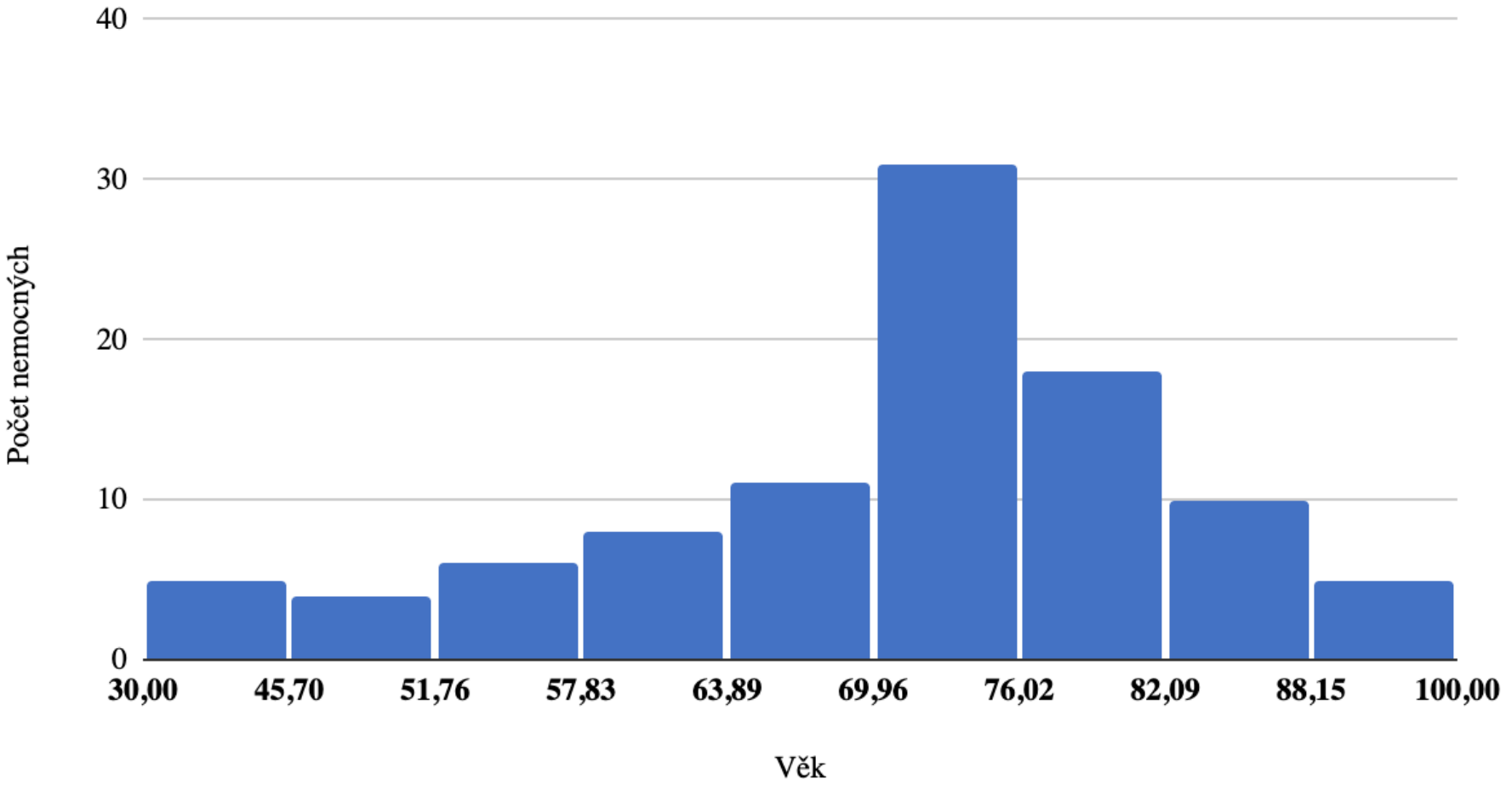
Věkové rozložení pacientů s dilatací levé síně



Průměrný věk 64 let
Medián 66 let

117 pacientů (4,9%)

Věkové rozložení pacientů s významnou AFMR



Průměrný věk 70let
Medián 74 let

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VZTAH DILATACE LEVÉ SÍNĚ A FIBRILACE SÍNÍ

1976

Check for updates

Relation between Echocardiographically Determined Left Atrial Size and Atrial Fibrillation

WALTER L. HENRY, M.D., JOEL MORGANROTH, M.D., ALAN S. PEARLMAN, M.D., CHESTER E. CLARK, M.D., DAVID R. REDWOOD, M.D., SAMUEL B. ITSCOITZ, M.D., AND STEPHEN E. EPSTEIN, M.D.

SUMMARY **In an attempt to define quantitatively the relation between left atrial size and atrial fibrillation, echocardiography was used to study 85 patients with isolated mitral valve disease, 50 patients with isolated aortic valve disease, and 130 patients with asymmetric septal hypertrophy. In all three groups of patients, atrial fibrillation was rare when left atrial dimension was below 40 mm (3 of 117 or 3%) but common when this dimension exceeded 40 mm (80 of 148 or 54%). In addition, when left atrial dimension exceeds 45 mm, cardioversion, while initially successful, is unlikely to produce sinus rhythm that can be maintained at least six months. These data suggest that left atrial size is an important factor in the development of atrial fibrillation and in determining the long term result of cardioversion. The pathophysiologic mechanism most consistent with this is that a chronic hemodynamic burden initially produces left atrial enlargement which in turn predisposes to atrial fibrillation. Only prospective studies will determine definitively whether these observations will be useful in decisions concerning prophylactic anticoagulation and elective cardioversion.**

ATRIAL FIBRILLATION occurs in association with a variety of disease states. A particularly strong association is found both in patients with mitral valve disease, and in patients with asymmetric septal hypertrophy (ASH), with the onset of this arrhythmia often precipitating or exacerbating the symptoms and signs of congestive heart failure.[1-3] In addition, the development of atrial fibrillation markedly increases the risk of embolization, a complication that often is devastating or sometimes fatal.[4-10]

Because rheumatic fever is the etiology of the mitral valve abnormalities in many patients with mitral valve disease, some investigators have suggested that atrial fibrillation is related to rheumatic involvement of the left atrial wall.[11] Others, however, have noted that patients with atrial fibrillation have a large left atrium and interpret this as evidence that atrial dilatation is in some way related to atrial fibrillation.[5, 12, 13] Still others have suggested that age is an important factor influencing the development of atrial fibrillation.[9]

These associations are important not only in understanding the pathophysiology of atrial fibrillation, but also have potentially important clinical and therapeutic implications. For instance, the embolic events that are a major complication of atrial fibrillation may occur at onset of the arrhythmia or shortly following conversion from atrial fibrillation to normal sinus rhythm.[4, 9, 14-16] Therefore, if a subgroup of patients in normal sinus rhythm could be identified who are at risk of developing atrial fibrillation, prophylactic anticoagulation and antiarrhythmic drugs might be used as a possible means of preventing fibrillation-induced emboli. In addition, if patients in atrial fibrillation could be identified who are unlikely to be maintained in sinus rhythm following cardioversion, attempts to convert the arrhythmia might be abandoned, thereby eliminating the risk of postcardioversion embolization.

Echocardiography has proven to be a valuable noninvasive tool for quantitatively assessing left atrial size.[17-19] In the present study, we used this technique to evaluate the association of left atrial size and the development of atrial fibrillation as well as the relation of left atrial size to the success or failure of cardioversion in patients with isolated mitral valve disease, asymmetric septal hypertrophy (ASH), and isolated aortic valve disease. In addition, we examined the prevalence of embolic complications in these same patients.

Methods

Patient Population

The study population consisted of 85 patients with isolated mitral valve disease (55 women, 30 men), 50 patients with isolated aortic valve disease (11 women, 39 men), and 130 patients with asymmetric septal hypertrophy (44 women, 86 men), in whom adequate echocardiograms were obtained during evaluation either in the outpatient clinic or the inpatient service of the National Heart and Lung Institute. The degree of functional impairment of the patients ranged from minimal to severe, and many of the latter required cardiac catheterization and operative intervention.

Echocardiographic Evaluation

The echocardiographic system used consists of an Ekoline 20A ultrasound unit, Honeywell 1856 Line Scan Recorder, Hewlett-Packard X-Y display, and a custom-built video amplifier. Echocardiographic studies were performed in every patient supine and in a basal state. In each patient with aortic valve disease, review of the echocardiograms failed to reveal evidence of mitral stenosis. In patients with asymmetric septal hypertrophy, the septal free-wall ratio (by definition) equaled or exceeded 1.3 in every case.[20]

Left Atrial Size

Left atrial dimension in early diastole was obtained in every patient by angling the ultrasound beam medially and in a cephalad direction from the mitral valve tip until the aortic root was seen. Minor angulations of the transducer

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Heart Rhythm Disorders

Evidence of Atrial Functional Mitral Regurgitation Due to Atrial Fibrillation

Reversal With Arrhythmia Control

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David J. Callans, MD,* Francis E. Marchlinski, MD,* Martin G. Keane, MD,* Frank E. Silvestry, MD*
Philadelphia, Pennsylvania; and Szeged, Hungary

Objectives The purpose of this study was to determine whether atrial fibrillation (AF) might cause significant mitral regurgitation (MR), and to see whether this MR improves with restoration of sinus rhythm.

Background MR can be classified by leaflet pathology (organic/primary and functional/secondary) and by leaflet motion (normal, excessive, restrictive). The prevalence of secondary functional leaflet motion MR remains controversial.

Methods We performed a retrospective cohort study. Patients undergoing first AF ablation at our institution (n = 828) were screened. Included patients had echocardiograms at the time of ablation and at 1-year clinical follow-up. The MR cohort (n = 53) had atrial functional MR. A control cohort (n = 53) was randomly selected from those patients (n = 660) with mild or less MR. Baseline echocardiographic and clinical characteristics were compared, and the effect of restoration of sinus rhythm was assessed by follow-up echocardiograms.

Results MR patients were older than controls and more often had persistent AF (62% vs. 23%, p < 0.0001). MR patients had larger left atria (volume index: 32 cm³/m² vs. 26 cm³/m², p = 0.008) and annular size (3.49 cm vs. 3.23 cm, p = 0.001), but similar left ventricular size and ejection fraction. Annular size, age and persistent AF were independently associated with MR. On follow-up echocardiogram, patients in continuous sinus rhythm had greater reductions in left atrial size and annular dimension, and lower rates of significant MR (24% vs. 82%, p = 0.005) compared with those in whom sinus rhythm was not restored.

Conclusions AF can result in "atrial functional MR" that improves if sinus rhythm is restored. (J Am Coll Cardiol 2011;58:1474–81) © 2011 by the American College of Cardiology Foundation

The mitral valve is an intricate structure, whose normal function depends on a complex interplay between the mitral leaflets, chordae tendinae, papillary muscles, left ventricle, and the mitral annulus to maintain normal function. Mitral regurgitation (MR) may occur when any part of this interplay is disrupted. MR can be categorized according to mitral leaflet motion using Carpentier's classification as normal (Type I), excessive (Type II), or restrictive (Type III) (1). A complimentary method of classifying MR is by the presence of mitral leaflet disease (primary or organic MR) versus only secondary involvement of the leaflets and ruptured chordae or papillary muscles, respectively. Examples of organic and secondary Type III MR include rheumatic valve disease and functional MR from dilated cardiomyopathy.

See page 1482

Normal leaflet motion MR is less common than the other types, and almost exclusively results from organic leaflet disease leading to annular dilation (2). In Carpentier's analysis of 551 cases of surgical MR, over 98% of the Type I

2024

The Natural History of Atrial Functional Mitral Regurgitation

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ABSTRACT

BACKGROUND The natural history of moderate/severe atrial functional mitral regurgitation (AFMR) is unknown.

OBJECTIVES The authors sought to study the incidence of left ventricular (LV) systolic dysfunction (LVSD), progression or regression of ≥mild-moderate AFMR, and impact on mortality.

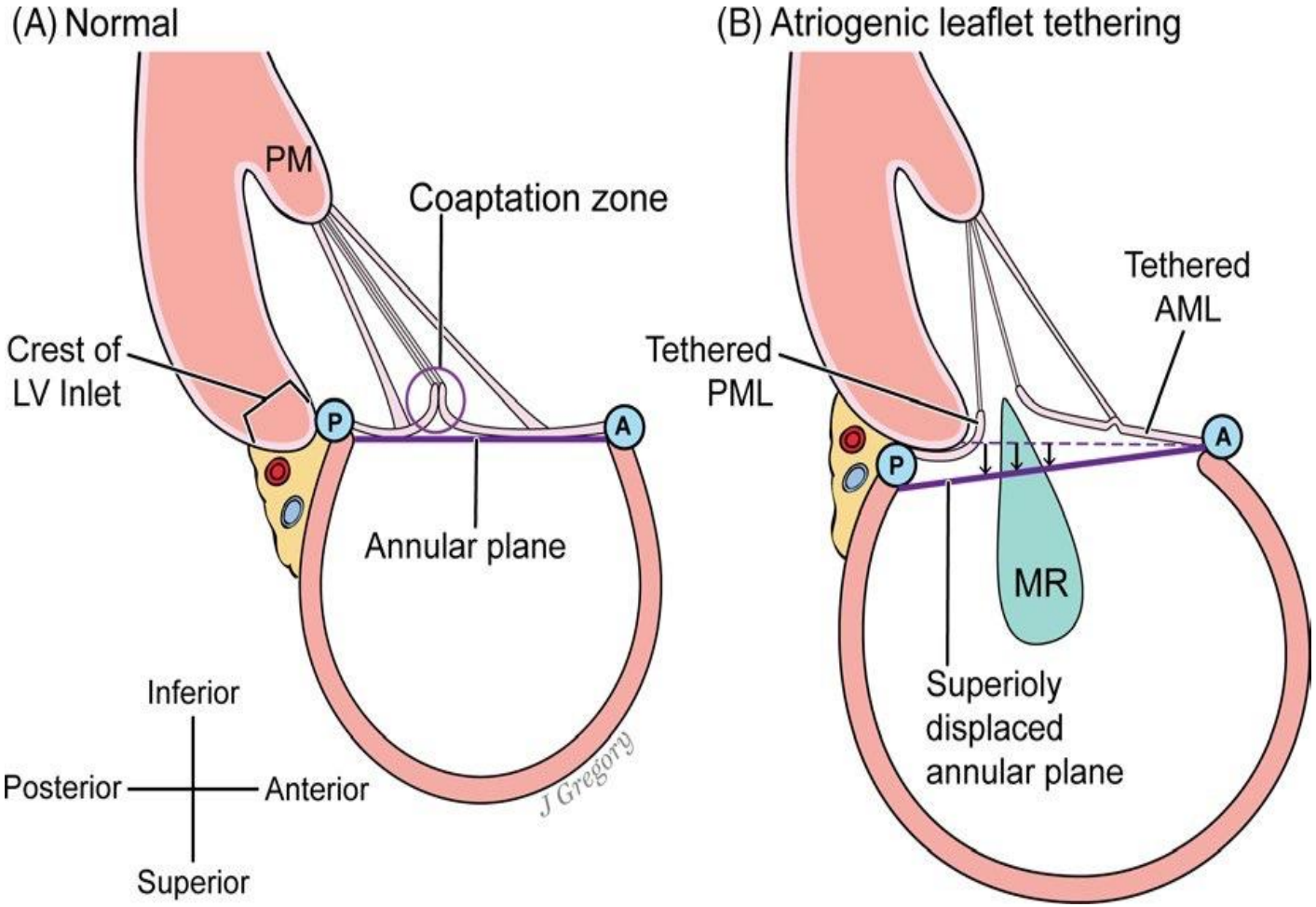
METHODS Adults with left atrial (LA) volume index ≥40 mL/m² and ≥mild moderate AFMR, and follow-up echocardiogram were followed for incident LVSD (ejection fraction <50% and ≥10% lower than baseline), progression of mild-moderate/moderate AFMR to severe, and persistent regression of AFMR to no/trivial. Relation of AFMR progression or regression as time-dependent covariates with all-cause mortality was studied. Incidence of LVSD was compared with patients with no/mild AFMR matched on age, sex, comorbidities and ejection fraction. Patients were followed until mitral intervention, myocardial infarction, or last follow-up.

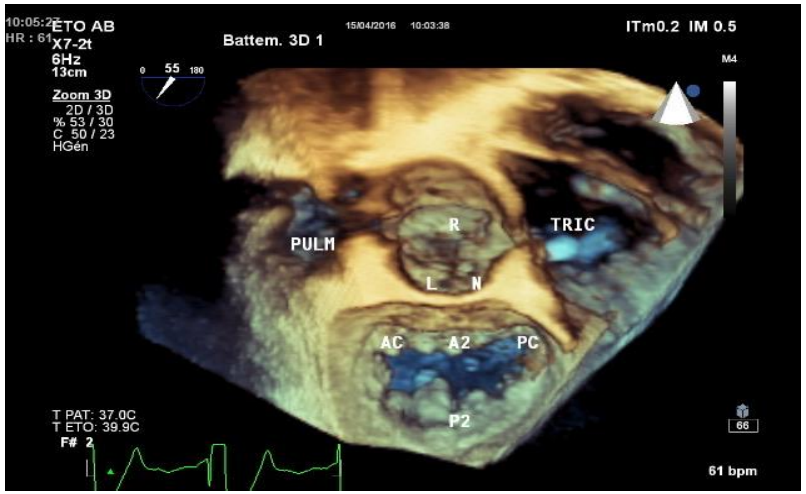
RESULTS A total of 635 patients (median age 75 years, 51% female, 96% mild-moderate/moderate AFMR, 4% severe AFMR) were included. Over a median 2.2 years (Q1-Q3: 1.0-4.3 years), incidence rates per 100 person-years were 3.2 for LVSD ($P = 0.52$ vs patients with no/mild AFMR), 1.9 for progression of AFMR, and 3.9 for regression. Female sex and larger LA volume index were independently associated with progression, whereas younger age, male sex, absent atrial fibrillation, and higher LA emptying fraction were independently associated with regression. Neither AFMR progression nor regression was independently associated with mortality. Instead, independent risk factors for mortality included older age, concentric LV geometry, and higher estimated LV filling and pulmonary pressures.

CONCLUSIONS In patients with predominantly mild-moderate/moderate AFMR, regression of MR was more common than progression, but neither was associated with mortality. Instead, diastolic function abnormalities were more important. Over a median 2-year follow-up, LVSD risk was not increased. (J Am Coll Cardiol 2024;83:1495–1507)

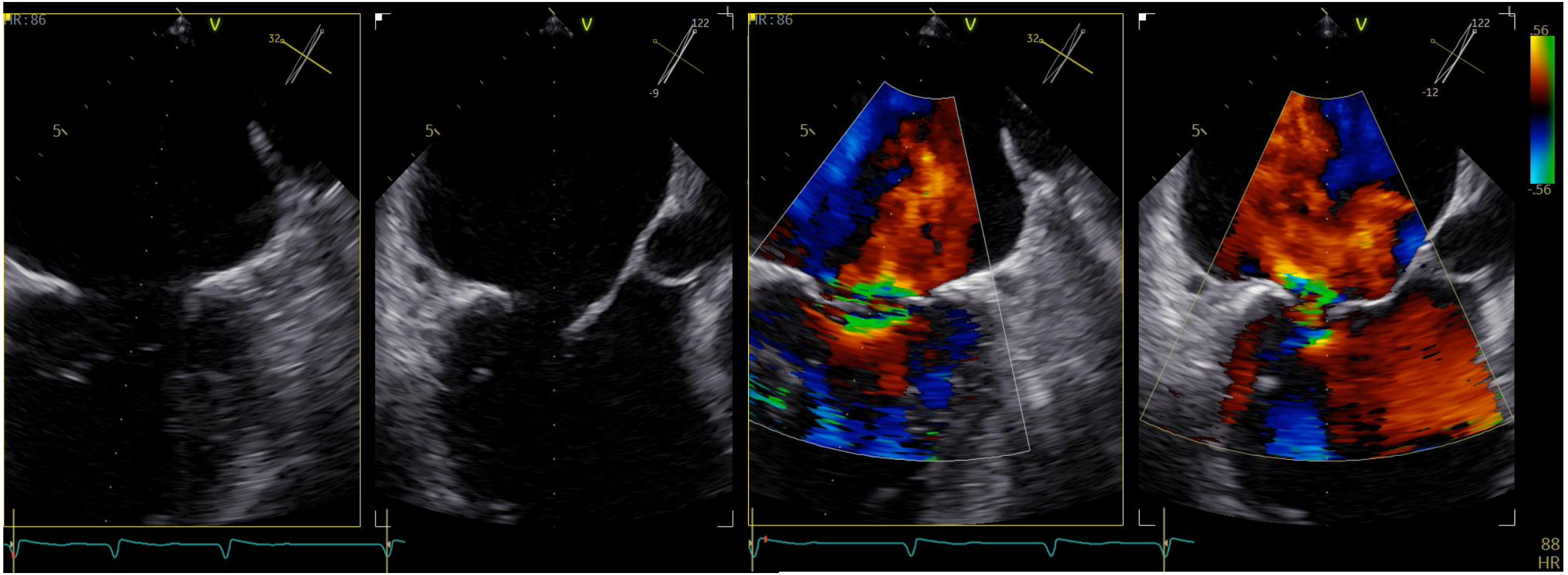
ZMĚNY U ATRIÁLNÍ FUNKČNÍ MITRÁLNÍ REGURGITACE

- Remodelace levé síně, vazivová přestavba
- Dilatace a remodelace mitrálního anulu
- **Tachykardií indukovaná atriální kardiomyopatie** při nedostatečné kontrole tepové frekvence



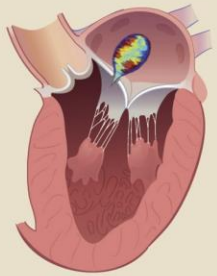
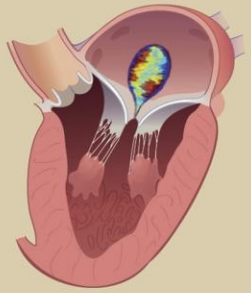
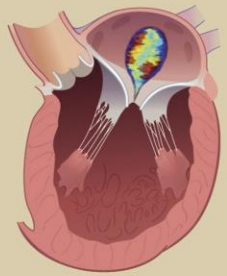
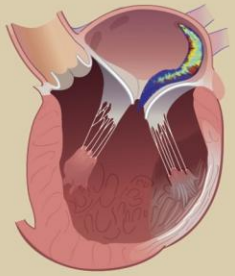


Jeffrey J. Silbiger MD, Mechanistic insights into atrial functional mitral regurgitation: Far more complicated than just left atrial remodeling, Echocardiography, 2018



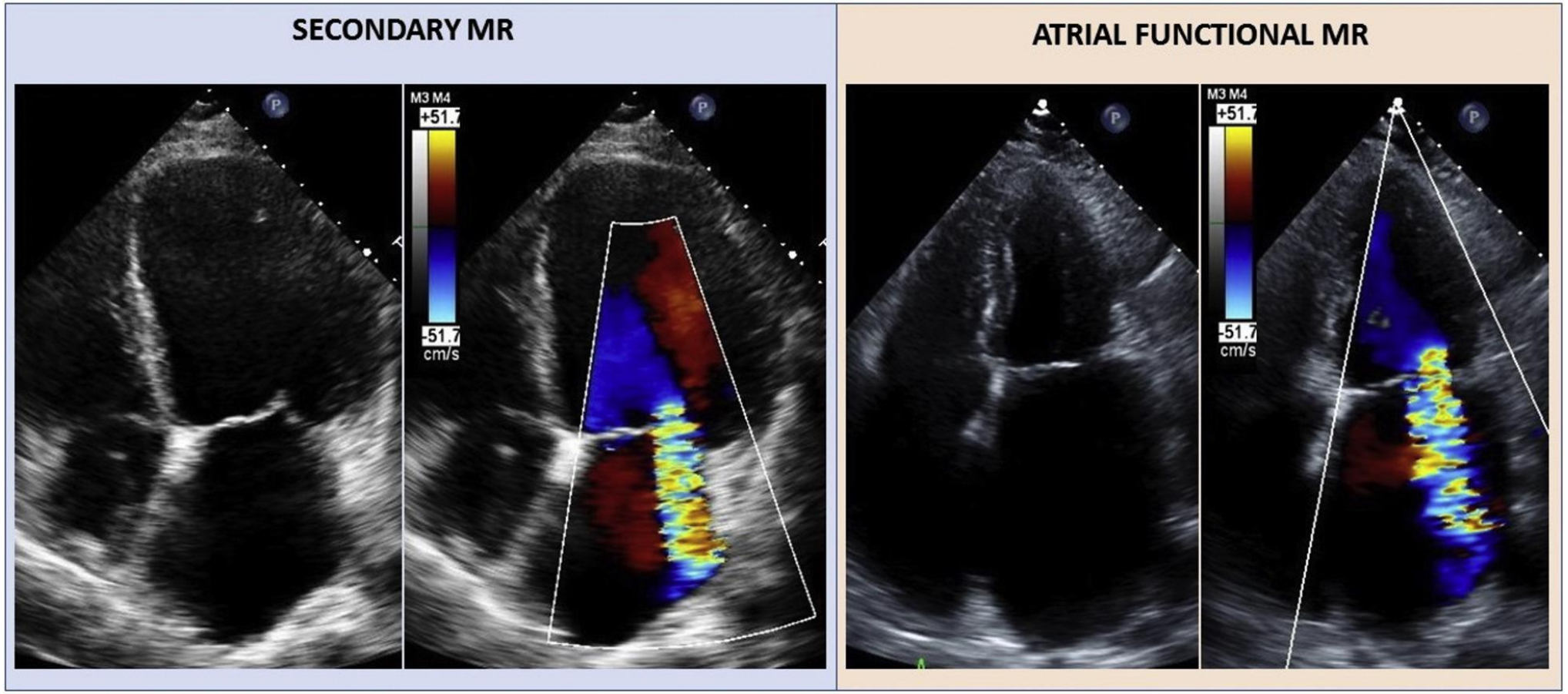
Archiv Echokardiografické laboratoře 2. interní kliniky VFN

CENTRAL ILLUSTRATION: Classification of the Etiology of MR

	Carpentier Type I	Carpentier Type II	Carpentier Type IIIa	Carpentier Type IIIb
	(normal leaflet motion and position)	(excess leaflet motion)	(restricted leaflet motion in systole and diastole)	(restricted leaflet motion in systole)
PRIMARY MR	 Leaflet Perforation Cleft	 Mitral Valve Prolapse	 Rheumatic Valve Disease Mitral Annular Calcification Drug Induced MR	
SECONDARY MR	 Atrial MR  Nonischemic Cardiomyopathy			 Ischemic Cardiomyopathy

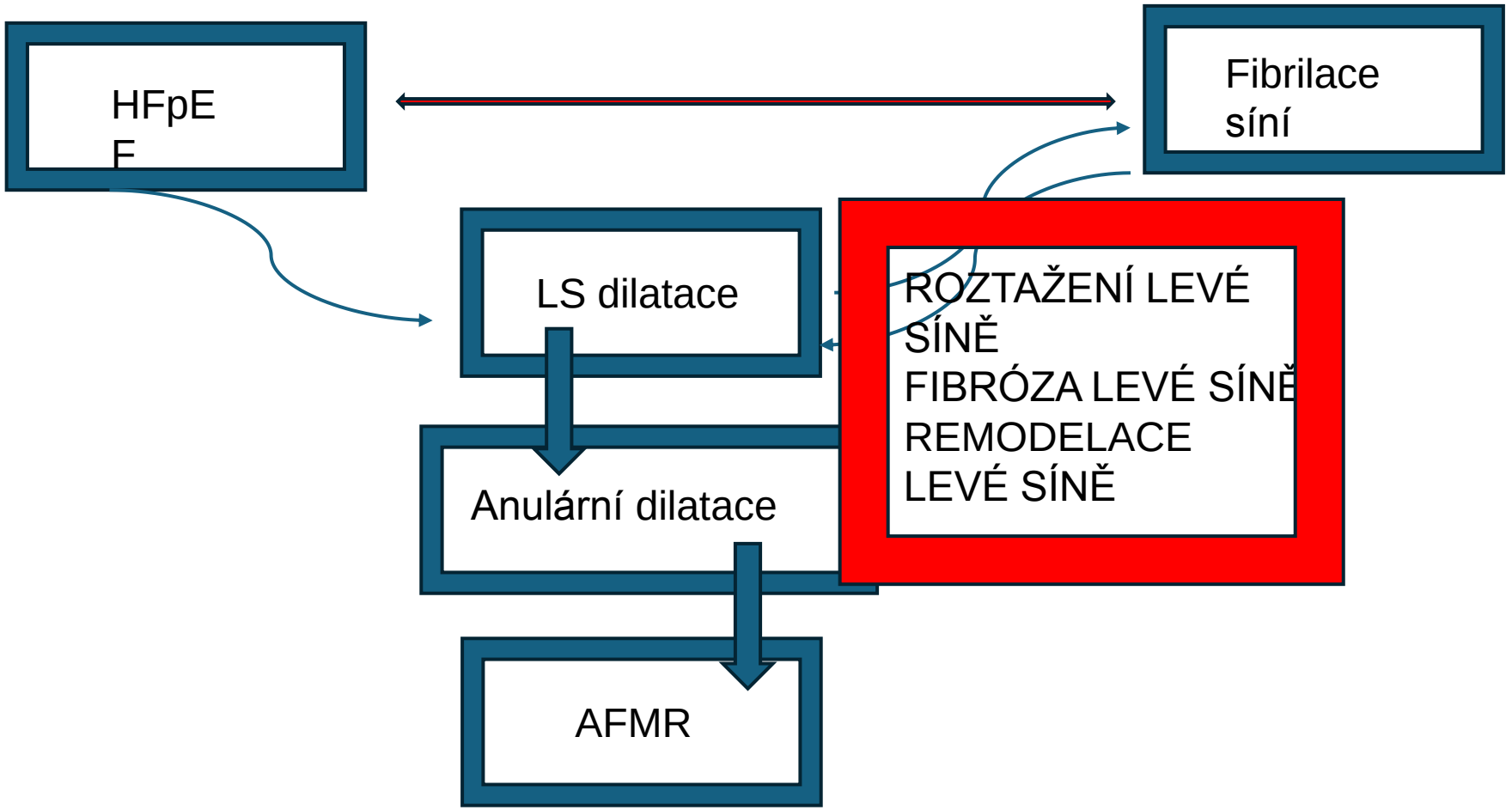
El Sabbagh, A. et al. J Am Coll Cardiol Img. 2018;11(4):628–43.

FUNKČNÍ MITRÁLNÍ REGURGITACE



Deferm S, Bertrand PB, Verbrugge FH, Verhaert D, Rega F, Thomas JD, Vandervoort PM. Atrial Functional Mitral Regurgitation: JACC Review Topic of the Week. J Am Coll Cardiol. 2019.

PATOFYZIOLOGIE VZNIKU ATRIÁLNÍ FUNKČNÍ MITRÁLNÍ REGURGITACE



PROBLÉMY DALŠÍHO VÝZKUMU AFMR

- Histopatologické změny nejsou ještě detailně prozkoumány
- Chybí pitevní nálezy

CO BY V BUDOUCNU MOHLO SNÍŽIT AFMR?

- Léčba fibrilace síní-ablace pulsním polem
- Léčba HFpEF

ECHOKARDIOGRAFICKÉ ZNÁMKY AFMR

- Normální velikost a EF levé komory
- Dilatovaná levá síň
- Zvětšený mitrální anulus
- Strukturálně normální cípy mitrální chlopně
- Pseudoprolaps předního cípu mitrální chlopně

SOUHRN:

- AFMR kauzálně souvisí s dilatovanou levou síní
- AFMR středně významnou nebo významnou můžeme detekovat u pacientů už po pěti až patnácti letech
- Průměrný věk pacientů s pouze dilatovanou levou síní v rámci neselektovaných echokardiografických vyšetření v je 64 let

ZÁVĚR:

- Z celkového počtu 57 366 echokardiografických vyšetření v letech 2008 až 2013 byla nalezena dilatovaná levé síň u 2 349 (4,09%) pacientů
- 336 pacientů (tj. 14,3 % z počtu pacientů s dilatovanou levou síní) dochází k rozvoji mitrální regurgitace významnější než lehké
- 117 pacientů (4,6 % z počtu pacientů s dilatovanou levou síní) mělo AFMR významnou regurgitaci

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DĚKUJI ZA POZORNOST