Mitrální regurgitace,historie diagnostiky a léčby

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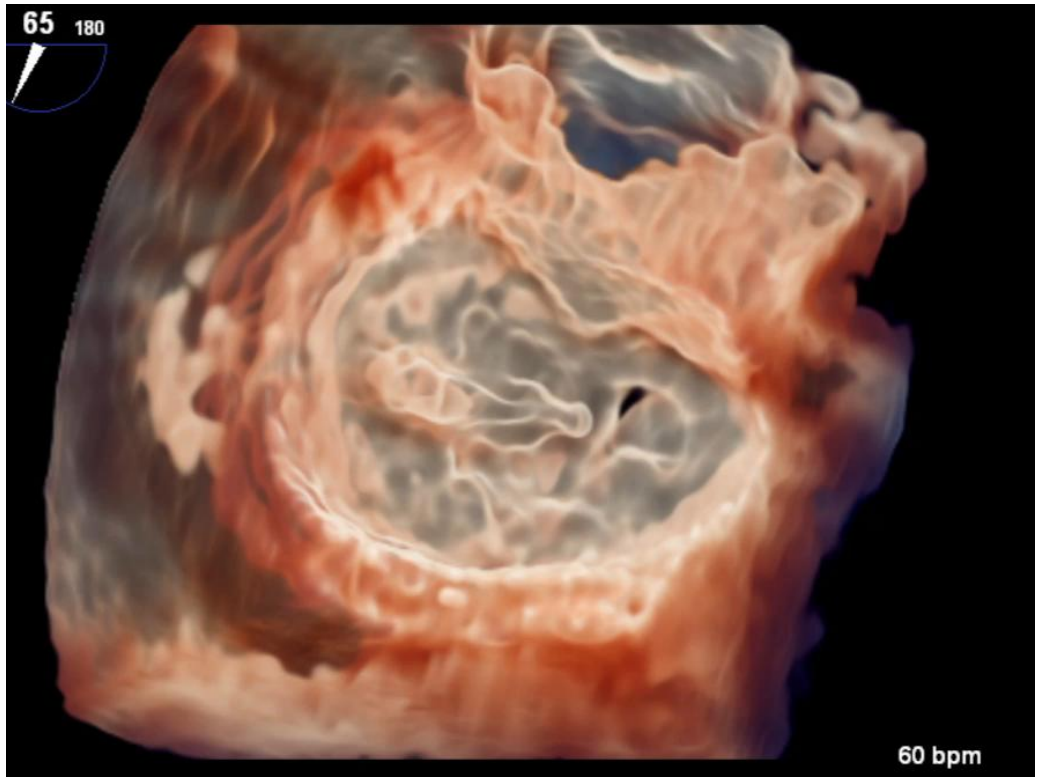
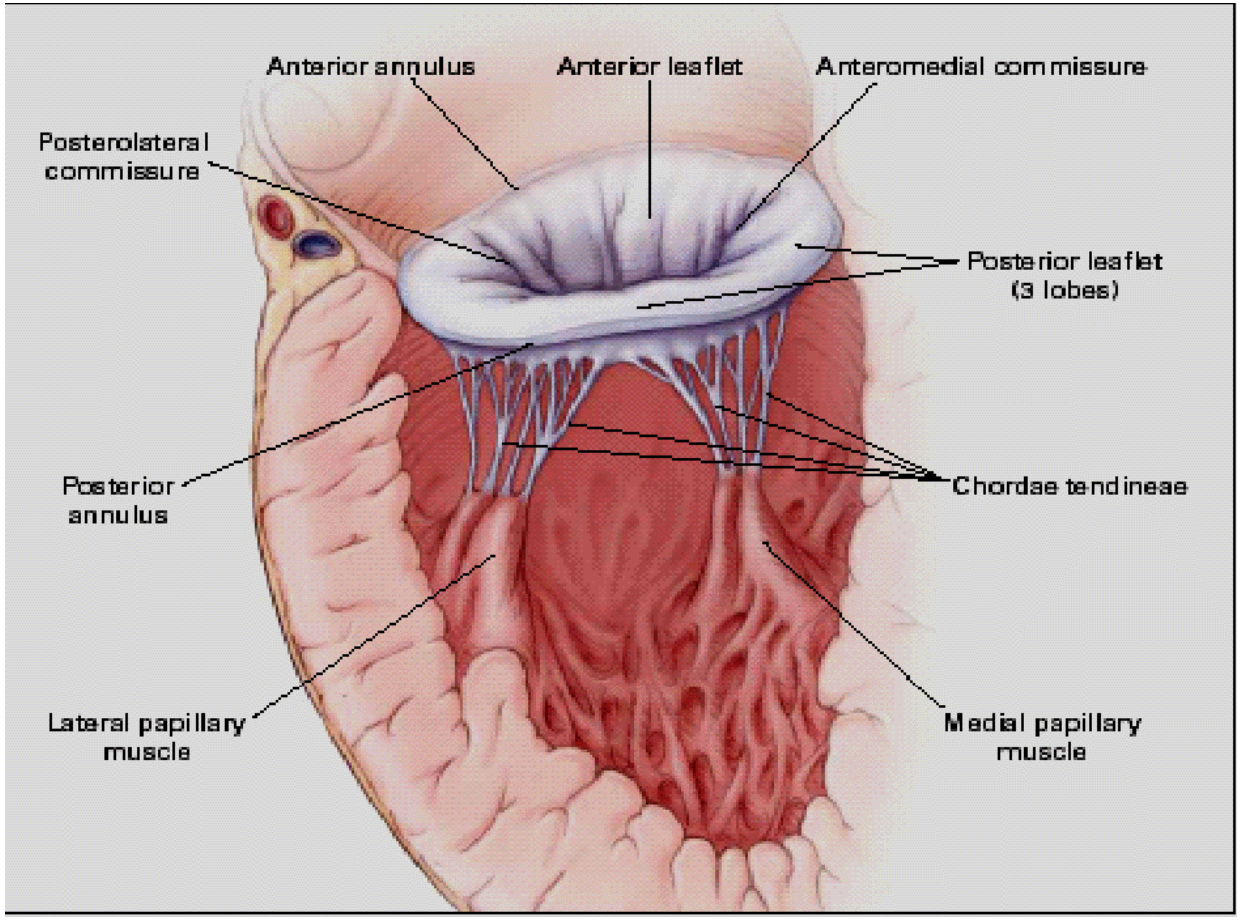
Praha

Echodny, Olomouc 2026

2 pohledy na mitrální chlopeň



Mitrální chlopeň - 6 funkčních komponent



1513

1513 | 1535,1543 | 1816 | 1953 | 1970 | 1990 | 2010 | 2020

1535, 1543

1513 | 1535,1543 | 1816 | 1953 | 1970 | 1990 | 2010 | 2020

Andrés de Laguna

Anatomica methodus, seu De sectione humani corporis contemplatio.

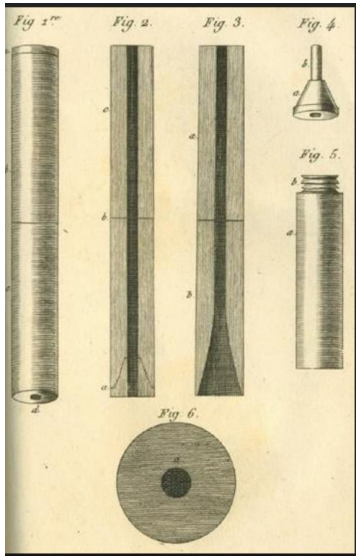
Andreas Vesalius

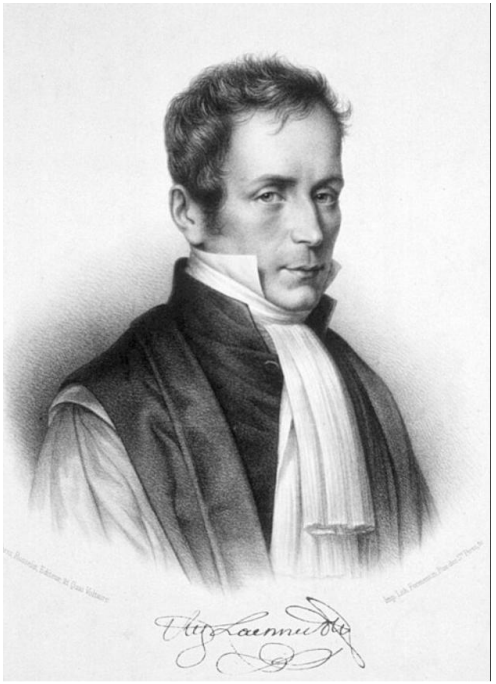
De humani corporis fabrica

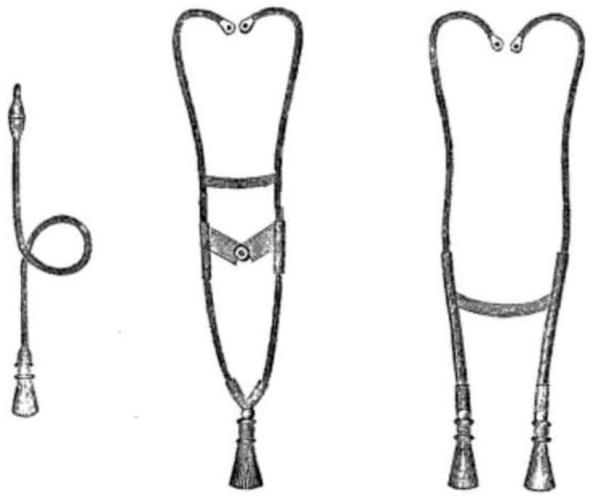
1816, když jediným nástrojem byl sluch

1513 | 1535,1543 | 1816 | 1953 | 1970 | 1990 | 2010 | 2020

René Laennec







1953, 1. echokardiografický přístroj

1513 — 1535,1543 — 1816 — **1953** — 1970 — 1990 — 2010 — 2020

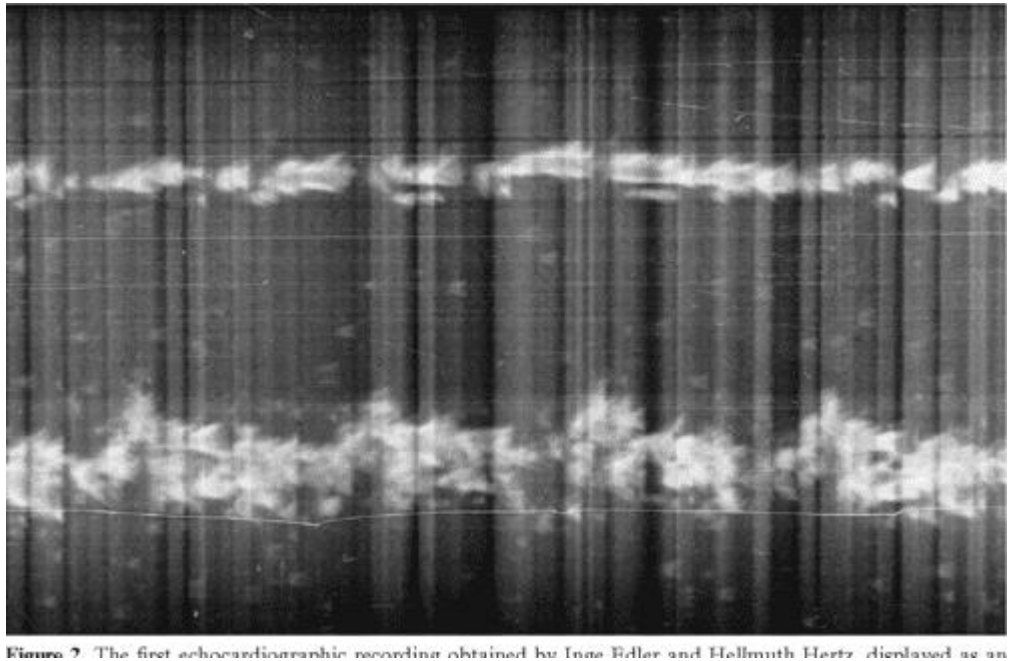
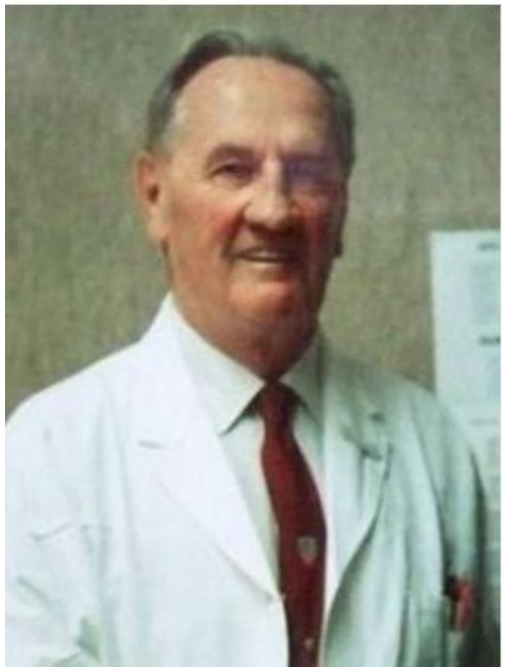


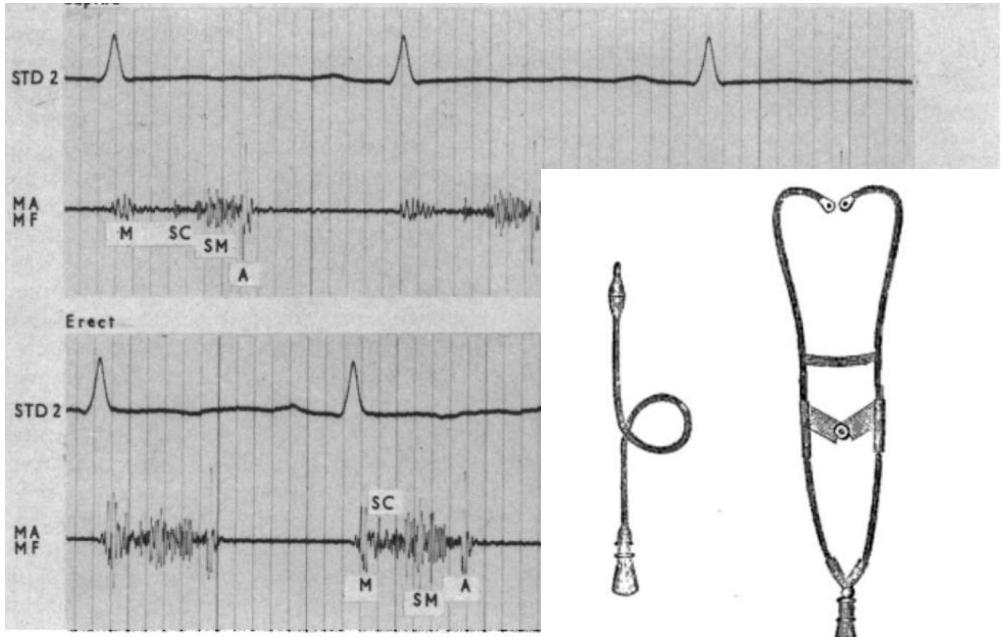
Figure 2. The first echocardiographic recording obtained by Inge Edler and Hellmuth Hertz, displayed as an

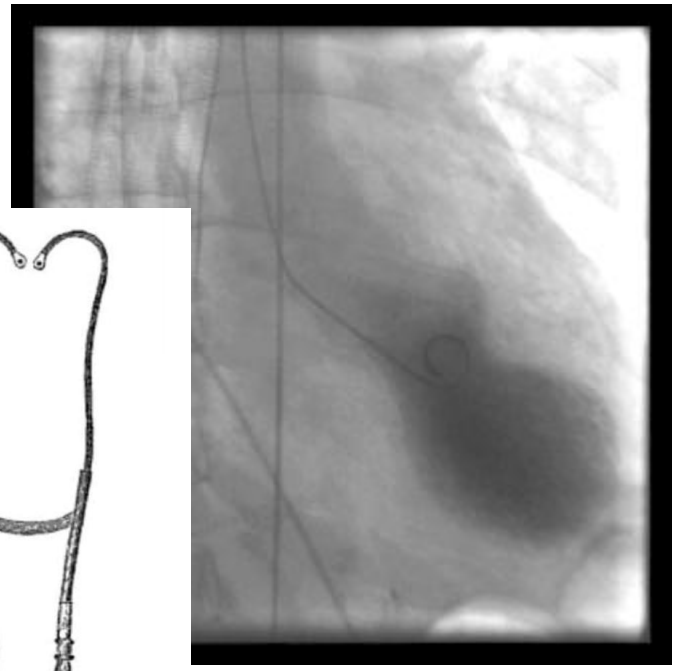
Dr. Inge Edler, Carl Helmut Hertz

1963

1513 | 1535,1543 | 1816 | 1953 | 1970 | 1990 | 2010 | 2020







John Barlow

1970 – 2010

1513 — 1535,1543 — 1816 — 1953 — 1970 — 1990 — 2010 — 2020

Období	Typ zobrazení	Technické řešení	Hlavní klinické využití
Polovina 70. let	1D (M-mód)	Pevný krystal na koaxiálním kabelu	Základní měření velikosti síní a pohybu chlopní
80. léta	2D Monoplánní	Elektronická sonda na ohebném gastroskopu	Diagnostika sraženin, infekcí chlopní (endokarditidy)
90. léta	2D Multiplánní + Doppler	Sonda s rotujícím úhlem pohledu (0°–180°)	Rutinní peroperační monitoring při kardiochirurgii
Po roce 2000	Real-time 3D	Matracové pole s tisíci krystaly	Navigace miniinvazivních a katetrizačních zákroků

2020

1513

1535,1543

1816

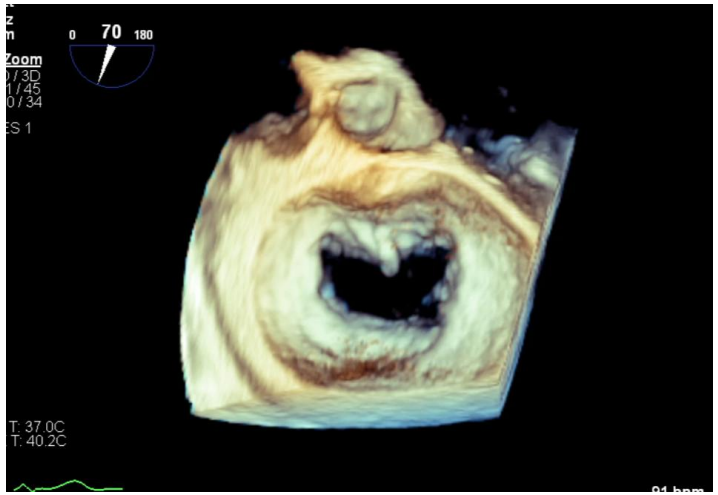
1953

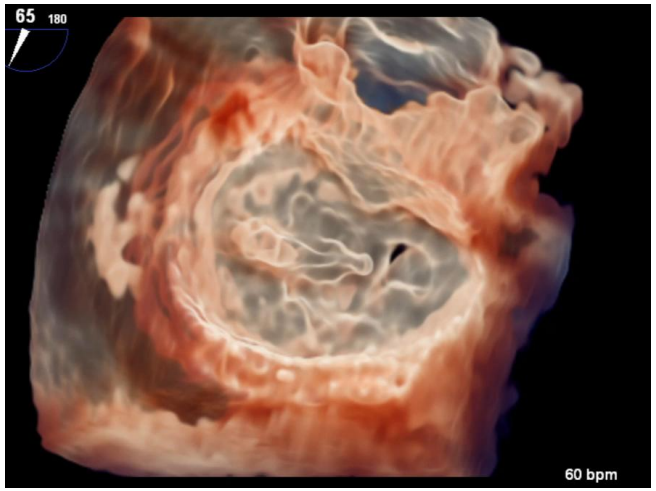
1970

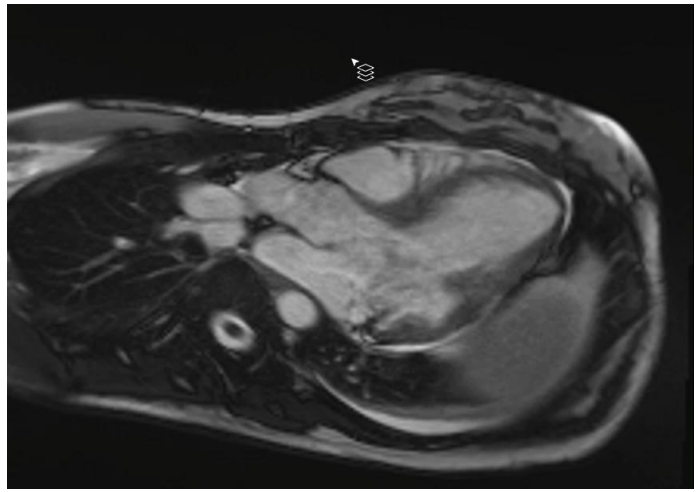
1990

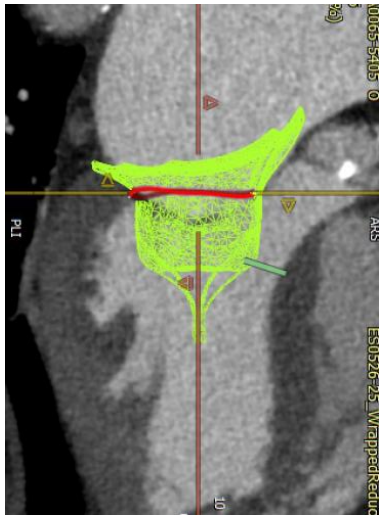
2010

2020









Diagnostika

Echokardiograficka diagnostika mitrální regurgitace v čase

1950–60s	1970s	1980s	1990s	2000s→
M-mode	**2D echo**	**Doppler**	**Kvantifikace**	**3D / integrace**
Nepřímé známky MR morfologie, dilatace LS/LK	Anatomie mitrálního aparátu prolaps • flail • chordy	PW/CW + color Doppler přímý průkaz regurgitace	VC • PISA • EROA • RVol plicní žilní tok	3D TTE/TEE • 3D VCA mechanismus + intervence

M-mode → 2D → Doppler → kvantifikace → 3D & mechanism-based assessment

Etiologie

Mitrální regurgitace

- Abnormita cípů, závěsného aparátu ?
  - Primární/ degenerativní MF
- Abnormita LK/ LS ?
  - Sekundární/ funkční MR

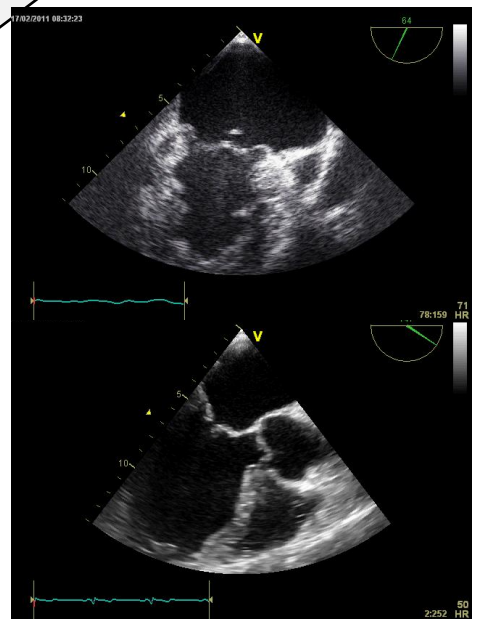
Carpentier typ II

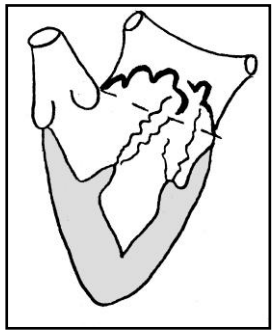
Carpentier typ I a III

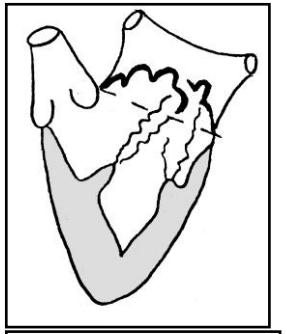
Primární MR- degenerativní etiologie

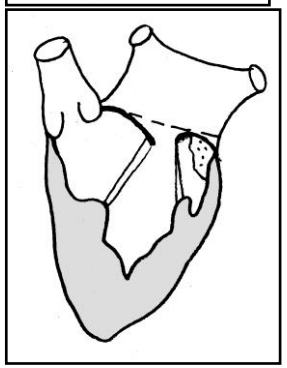
Hlavní patologie je v cípech, šlašinkách, prstenci

Characteristics	FD	Advanced FD	Forme fruste	Barlow's dis
				
Age at diagnosis	>60 years	>60 years		<60 years
History of MR	<5 years	<5 years	ble	>10 year
Leaflet tissue	Normal/Translucent	++	++/+++	+++
Anterior leaflet tissue	+		++	+++
Posterior leaflet tissue	++		++/+++	+++
Segments affected	Single segme	e segment (P2)	Multisegment	Multisegment
Chordae tendineae	Thin an	Thin and ruptured	Variable	Thickened and elongated
Annular dilatation		↑ (≤32 mm)	↑↑ (32-36 mm)	↑↑↑ (≥ 36 mm)
Calcification	No	+	+/++	+++







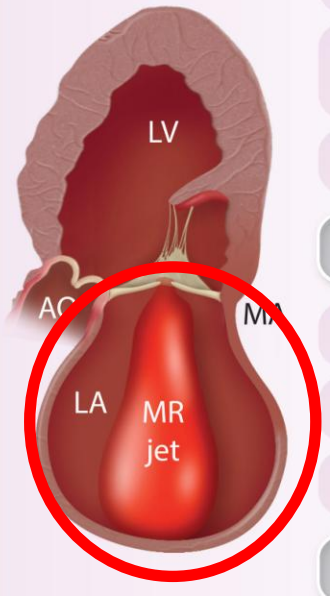


Fibroelastická degenerace, porucha fibroelastických vláken
Myxomatózní degenerace, infiltrace myxomatozní, změny kolagenu a hromadění mukopolysacharidů
Sklerotická degenerace , skl. cípy nebo izolované kalcifikace prstence
St.p. infekční endokarditidě

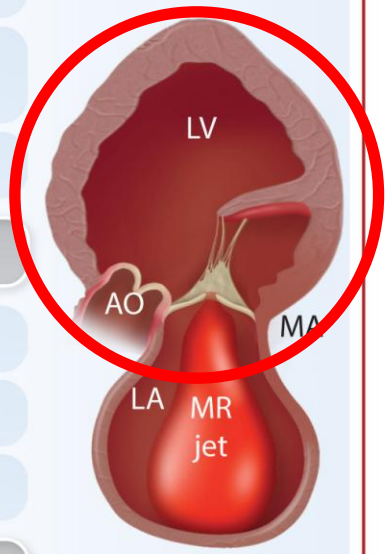
Sekundární mitrální regurgitace

Key criteria	
LVEF ≥50% without regional wall motion abnormalities	LVEF <50% with or without regional wall abnormalities
No or mildly dilated LV cavity[a] without leaflet tethering	Restrictive leaflet motion with tethering
Mitral annulus dilatation (AP >35 mm)	Normal leaflet morphology
Enlarged LA (LAVI >34 mL/m^2)	Central or eccentric jet
Additional echocardiographic criteria[b]	
Normal leaflet motion	Dilated LV
Normal leaflet morphology	Dilated LA
Usually central jet	Dilated MV annulus
Additional clinical criteria	
Atrial fibrillation	Ischaemic heart disease
HFpEF	Dilated cardiomyopathy

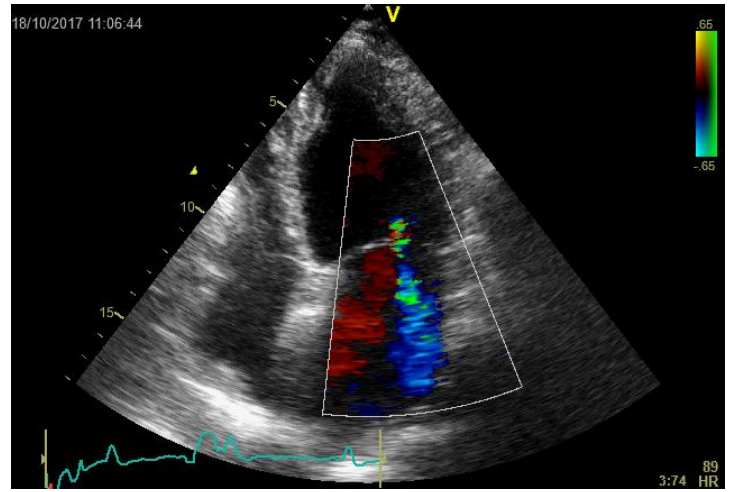
Atrial SMR

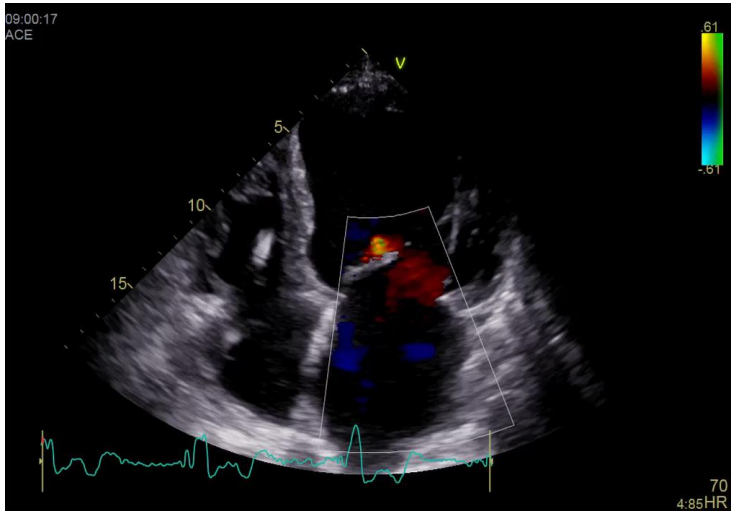


Ventricular SMR



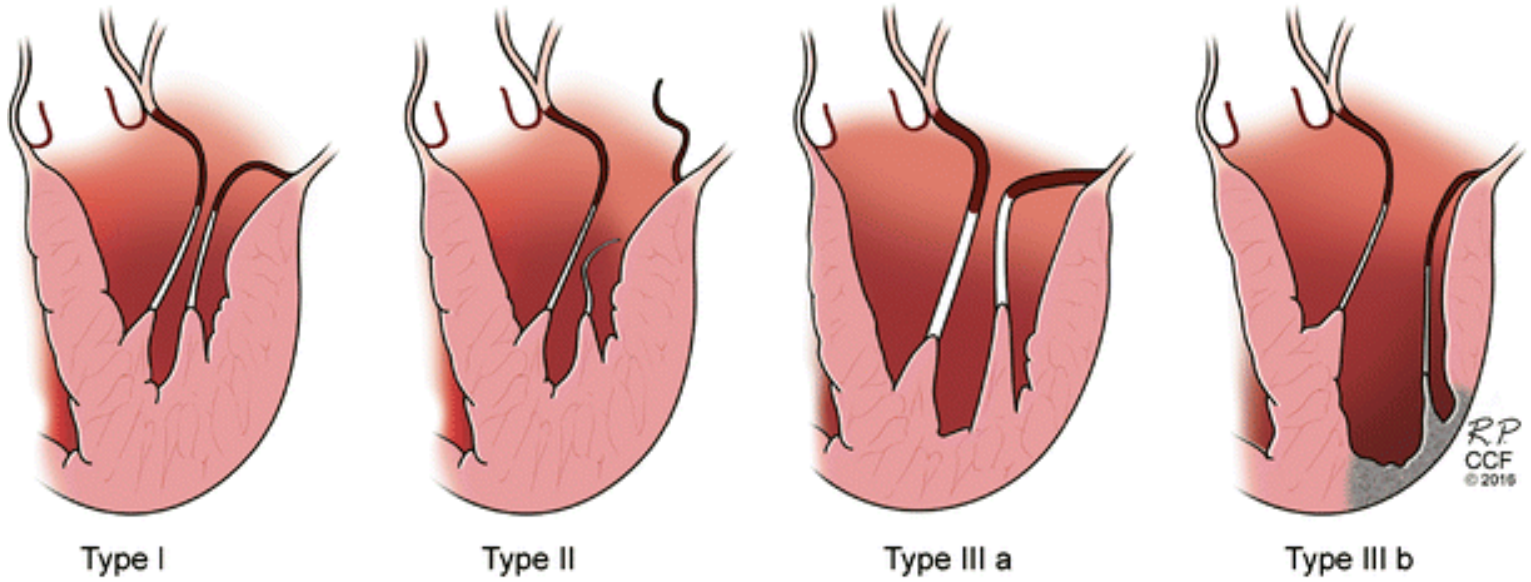
ESC EACTS





Eur Heart J, ehaf194, https://doi.org/10.1093/eurheartj/ehaf194

Zhodnocení mechanismu mitrální regurgitace



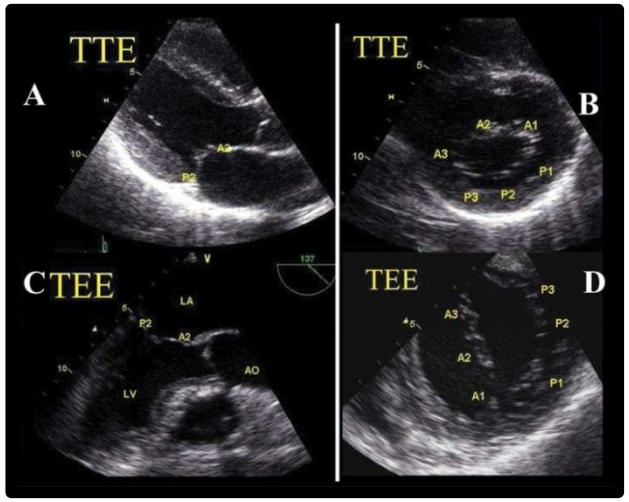
Normální pohyb cípů

Nadměrný pohyb cípů

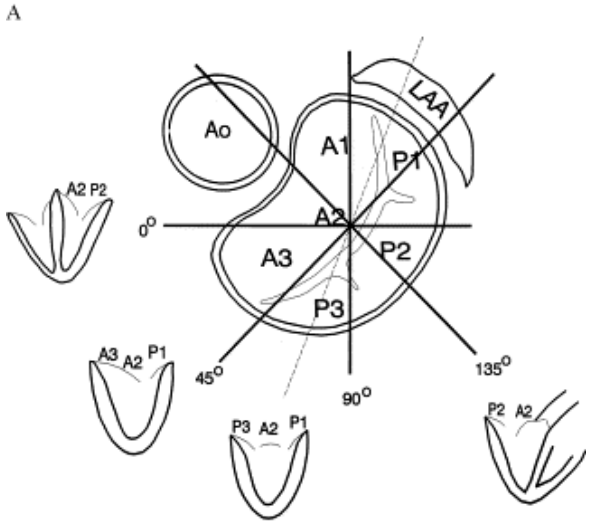
Omezený pohyb cípů

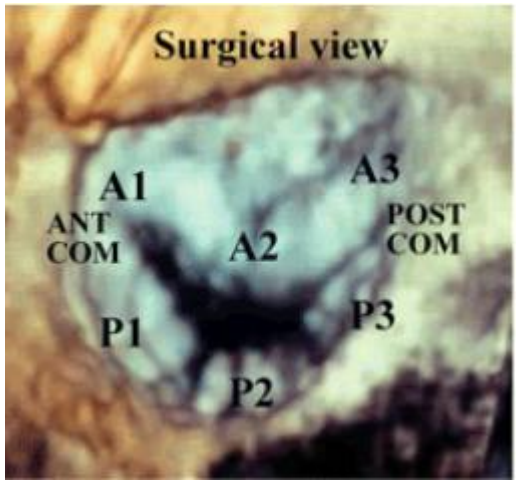
Dilatace prstence Žádný/ diskrétní tethering	Flail Prolaps	Malý prstenec Sklerotické cípy	Dilatace anulu (střední) Tethering

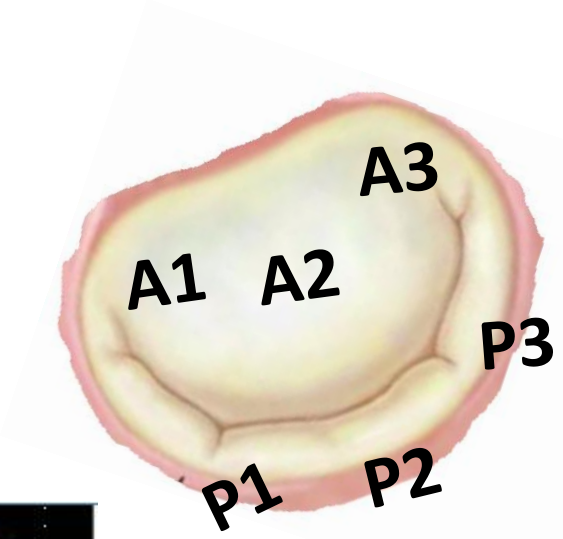
Echokardiografická segmentální - analýza

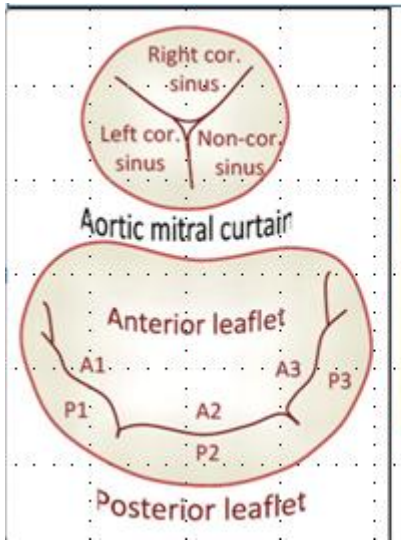


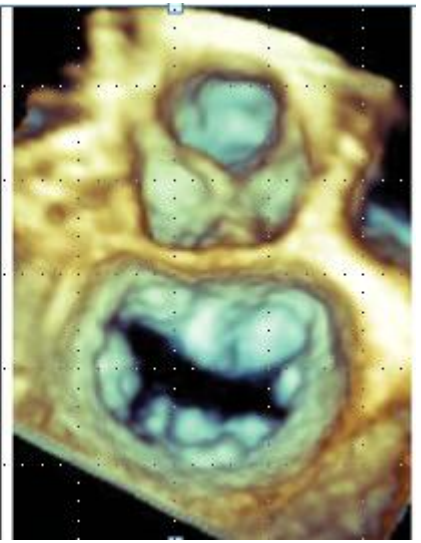
Inferior/Posterior



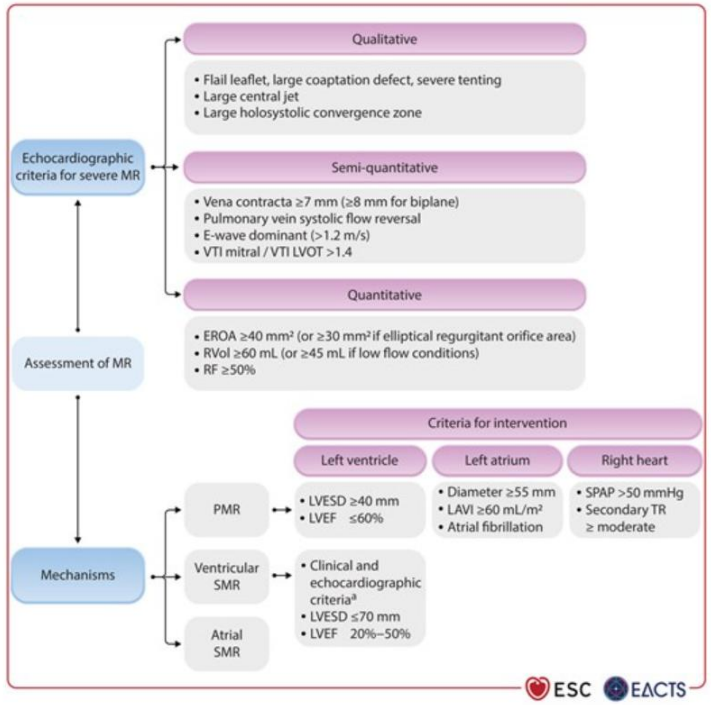


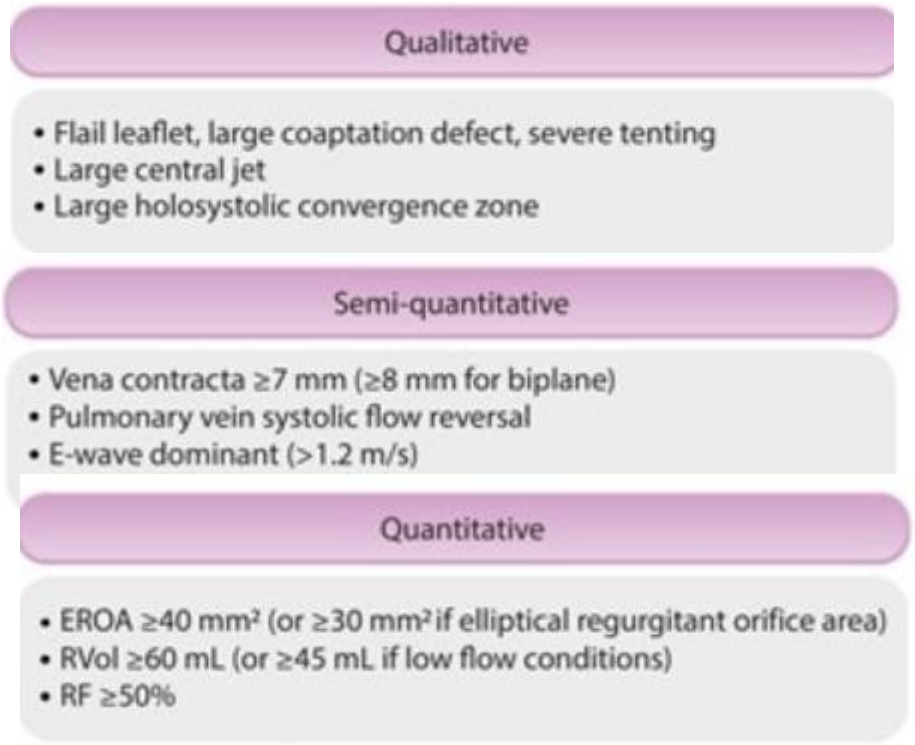


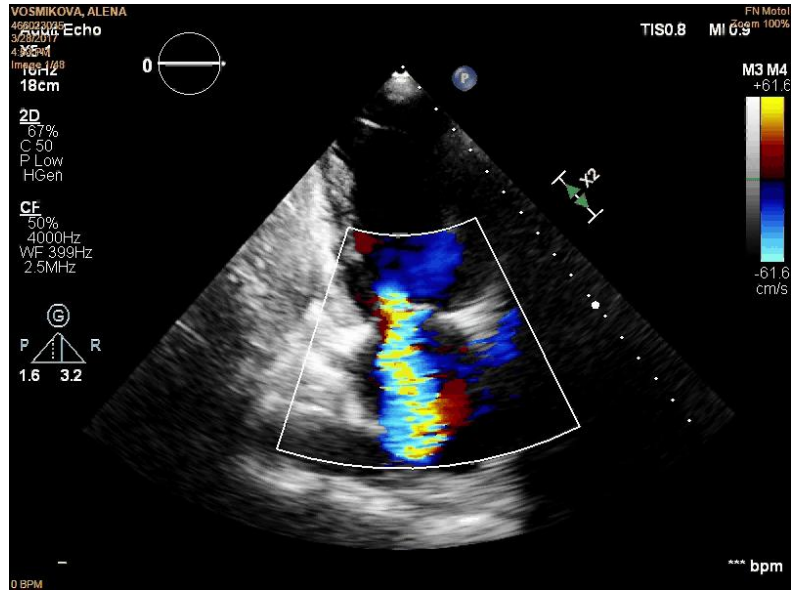




Kritéria významné mitrální regurgitace - 2D echokardiografie

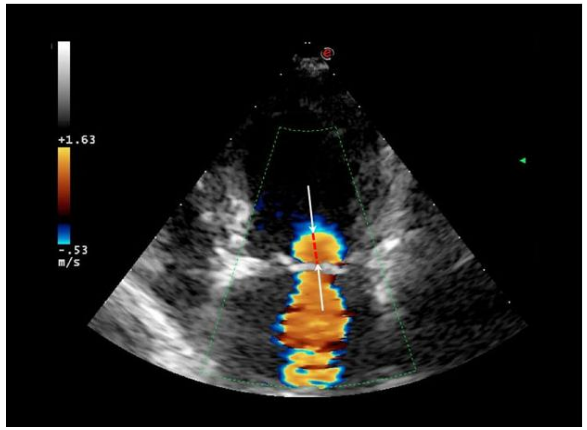


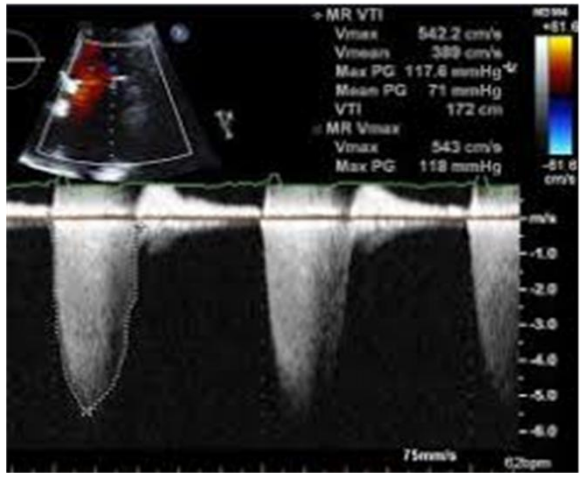




Převzato a upraveno dle Eur Heart J, ehaf194

PISA

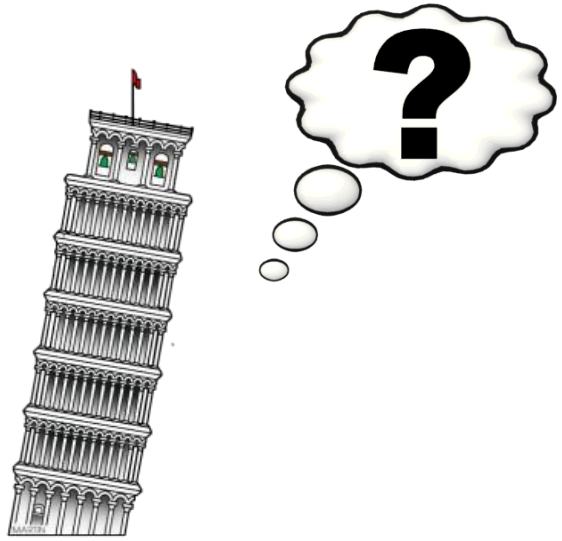




VFR = 2 * π * r2 * Vr

ERO = VFR / VMax

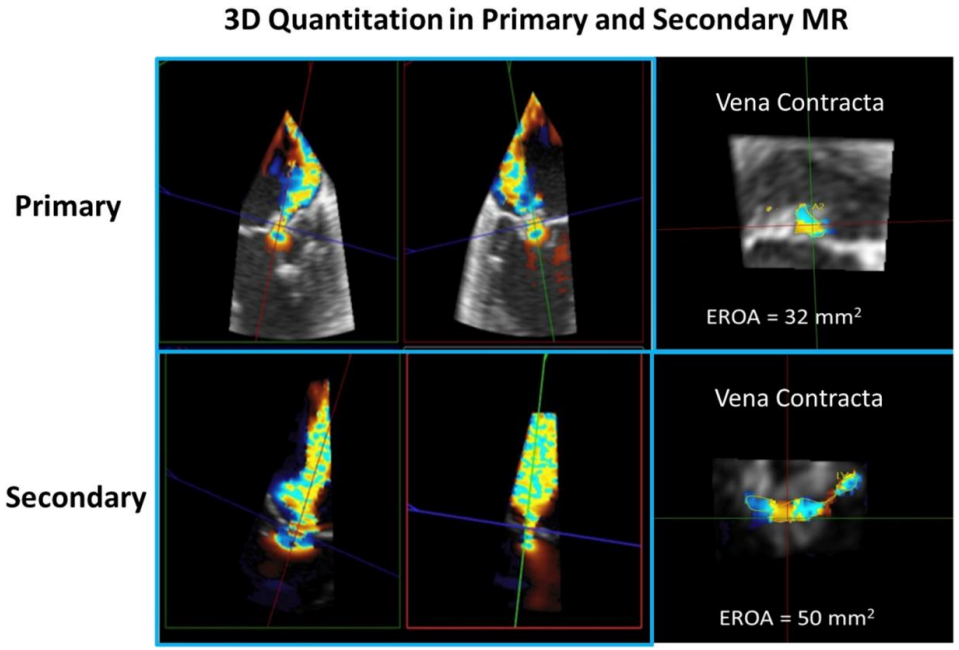
RVol = ERO * VTI

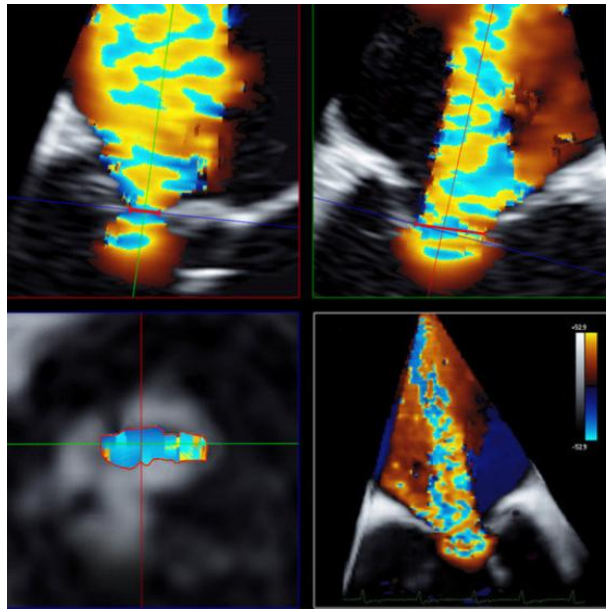


3D – vena contracta area

Stopová MR 0-1 — Mírná MR 1+ — Mírná- střední 2+ — Střední –významná 3+ — Významná 4+

EROA -VCA (cm ^{2}) < 0,2 | **EROA -VCA (cm ^{2}) : 0,2** | **EROA -VCA (cm ^{2}) :0,2- 0,29** | **EROA -VCA (cm ^{2}) : 0,3-0.39** | **EROA -VCA (cm ^{2}) ≥0,40**





Převzato a upraveno dle Zoghbi, JASE 2017

Jak se změnilo hodnocení závažnosti MR?

1 Color Doppler jet

- Velikost/plochu jetu bylo možné rychle vizualizovat
- Výrazná závislost na nastavení a hemodynamice
- Excentrický Coandův jet může závažnost podhodnotit

2 Kvantitativní echo

- Vena contracta
- PISA → EROA
- Regurgitační objem / frakce
- Plicní žilní tok

3 Současný koncept

- Morfologie + mechanismus MR
- VC / PISA / EROA / RVol
- CW Doppler + plicní žíly
- Remodelace LK/LS + 3D

Klíčový posun v diagnostickém myšlení

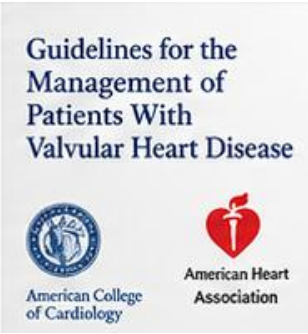
„Jak velký je jet ?“ → „ Jaký je mechanismus, regurgitační ústí a hemodynamické konsekvence?“

Závažnost MR = integrace více parametrů; žádný jednotlivý ukazatel není univerzálně dostačující.

Léčba mitrální regurgitace

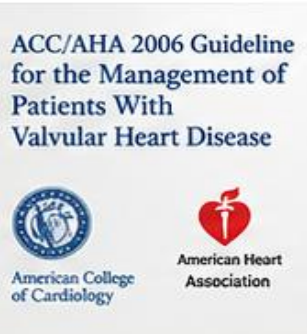
Vývoj doporučení pro chlopenní vady

1998



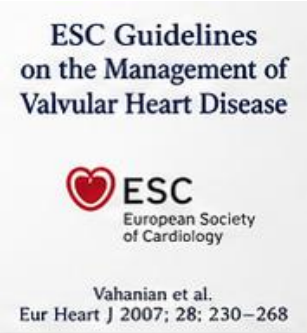
Expertní názor a klinická zkušenost

2006



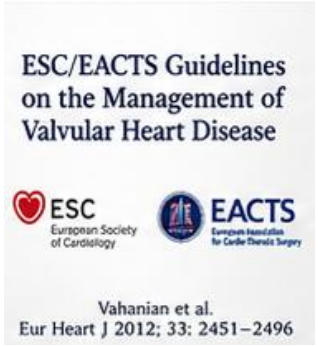
Větší role imagingu

2007



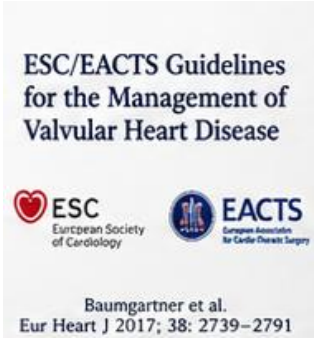
Evropský konsenzus

2012



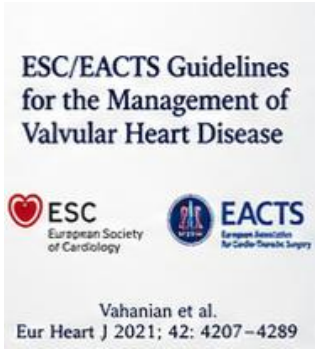
Společně ESC a EACTS

2017



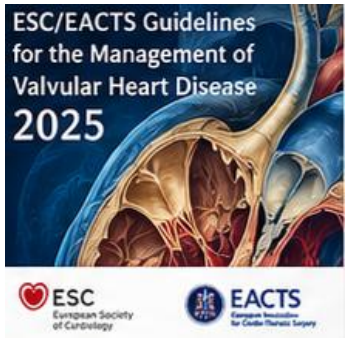
Heart team, struktur ální intervence

2021



Transkatétrová léčba v doporučení

2025



Časnější a individualizovná léčba

Historie chirurgické léčby mitrální regurgitace

1950s
Počátky chirurgie
Uzavřené výkony a první pokusy o korekci mitrální vady

1960s
Náhrada chlopně
Rozvoj mimotělního oběhu mechanické protézy

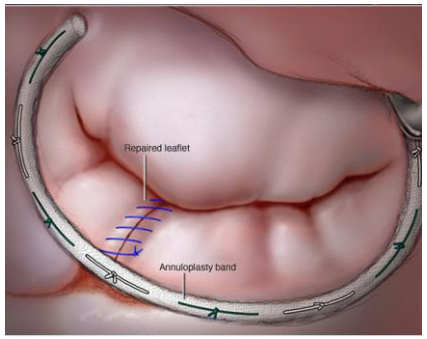
1970–80s
Éra rekonstrukce
Carpentier: systematická analýza mechanismu + anuloplastika

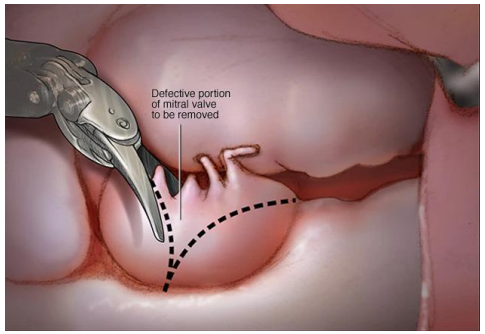
1990–2000s
Repair first
Resekce / chordální techniky rostoucí podíl plastik u DMR

2010s→
Moderní repair
Neochordy • respekt tkáně miniinvazivní/robotické přístupy

ZÁSADNÍ KONCEPČNÍ POSUN

replacement → reconstruction → mechanism-based & tissue-preserving repair





Historie chirurgické léčby mitrální regurgitace

Od náhrady chlopně k rekonstrukční chirurgii a zachování mitrálního aparátu

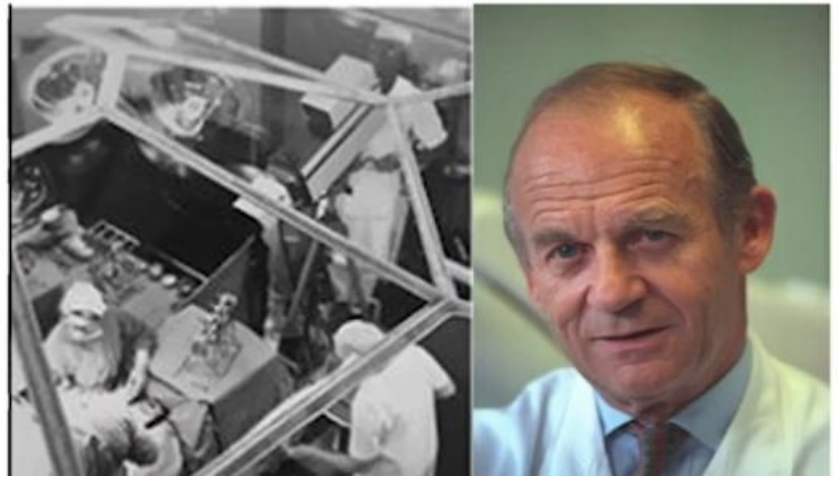
1950s — **Počátky chirurgie**

1960s — **Náhrada chlopně**

1970–80s — **Éra rekonstrukce**

1990–2000s — **Repair first**

2010s→ — **Moderní repair**



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1950s — **Počátky chirurgie**

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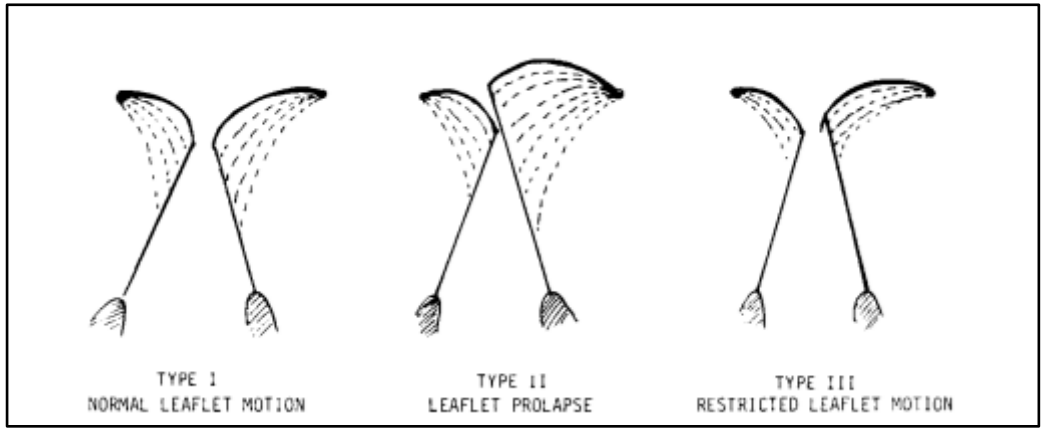
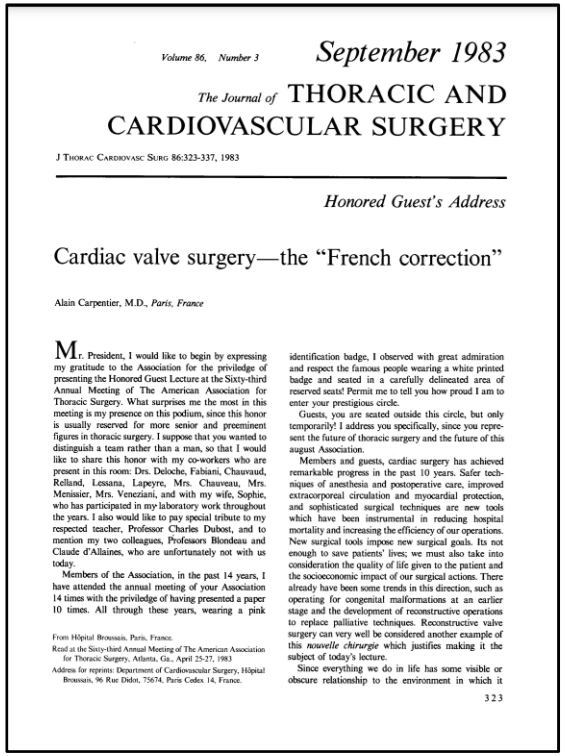


Etiologie → **Léze** → **Dysfunkce**



Volume 86, Number 3 — *September 1983*

The Journal of THORACIC AND CARDIOVASCULAR SURGERY

J Thorac Cardiovasc Surg 86:323-337, 1983

Honored Guest's Address

Cardiac valve surgery—the "French correction"

Alain Carpentier, M.D., *Paris, France*

Mr. President, I would like to begin by expressing my gratitude to the Association for the privilege of presenting the Honored Guest Lecture at the Sixty-third Annual Meeting of The American Association for Thoracic Surgery. What surprises me the most in this meeting is my presence on this podium, since this honor is usually reserved for more senior and preeminent figures in thoracic surgery. I suppose that you wanted to distinguish a team rather than a man, so that I would like to share this honor with my co-workers who are present in this room: Drs. Deloche, Fabiani, Chauvaud, Relland, Lessana, Lapeyre, Mrs. Chauveau, Mrs. Menisier, Mrs. Venziani, and with my wife, Sophie, who has participated in my laboratory work throughout the years. I also would like to pay special tribute to my respected teacher, Professor Charles Dubost, and to mention my two colleagues, Professors Blondeau and Claude d'Allaines, who are unfortunately not with us today.

Members of the Association, in the past 14 years, I have attended the annual meeting of your Association 14 times with the privilege of having presented a paper 10 times. All through these years, wearing a pink identification badge, I observed with great admiration and respect the famous people wearing a white printed badge and seated in a carefully delineated area of reserved seats! Permit me to tell you how proud I am to enter your prestigious circle.

Guests, you are seated outside this circle, but only temporarily! I address you specifically, since you represent the future of thoracic surgery and the future of this august Association.

Members and guests, cardiac surgery has achieved remarkable progress in the past 10 years. Safer techniques of anesthesia and postoperative care, improved extracorporeal circulation and myocardial protection, and sophisticated surgical techniques are new tools which have been instrumental in reducing hospital mortality and increasing the efficiency of our operations. New surgical tools impose new surgical goals. Its not enough to save patients' lives; we must also take into consideration the quality of life given to the patient and the socioeconomic impact of our surgical actions. There already have been some trends in this direction, such as operating for congenital malformations at an earlier stage and the development of reconstructive operations to replace palliative techniques. Reconstructive valve surgery can very well be considered another example of this *nouvelle chirurgie* which justifies making it the subject of today's lecture.

Since everything we do in life has some visible or obscure relationship to the environment in which it

From Hôpital Broussais, Paris, France.

Read at the Sixty-third Annual Meeting of The American Association for Thoracic Surgery, Atlanta, Ga., April 25-27, 1983

Address for reprints: Department of Cardiovascular Surgery, Hôpital Broussais, 96 Rue Didot, 75674, Paris Cedex 14, France.

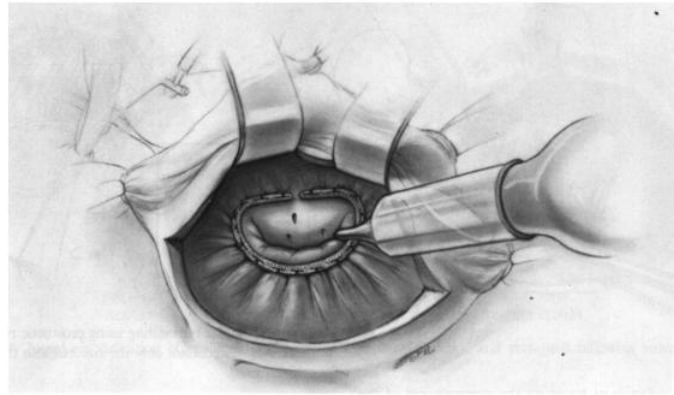
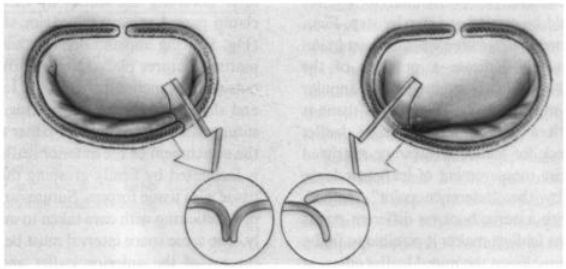
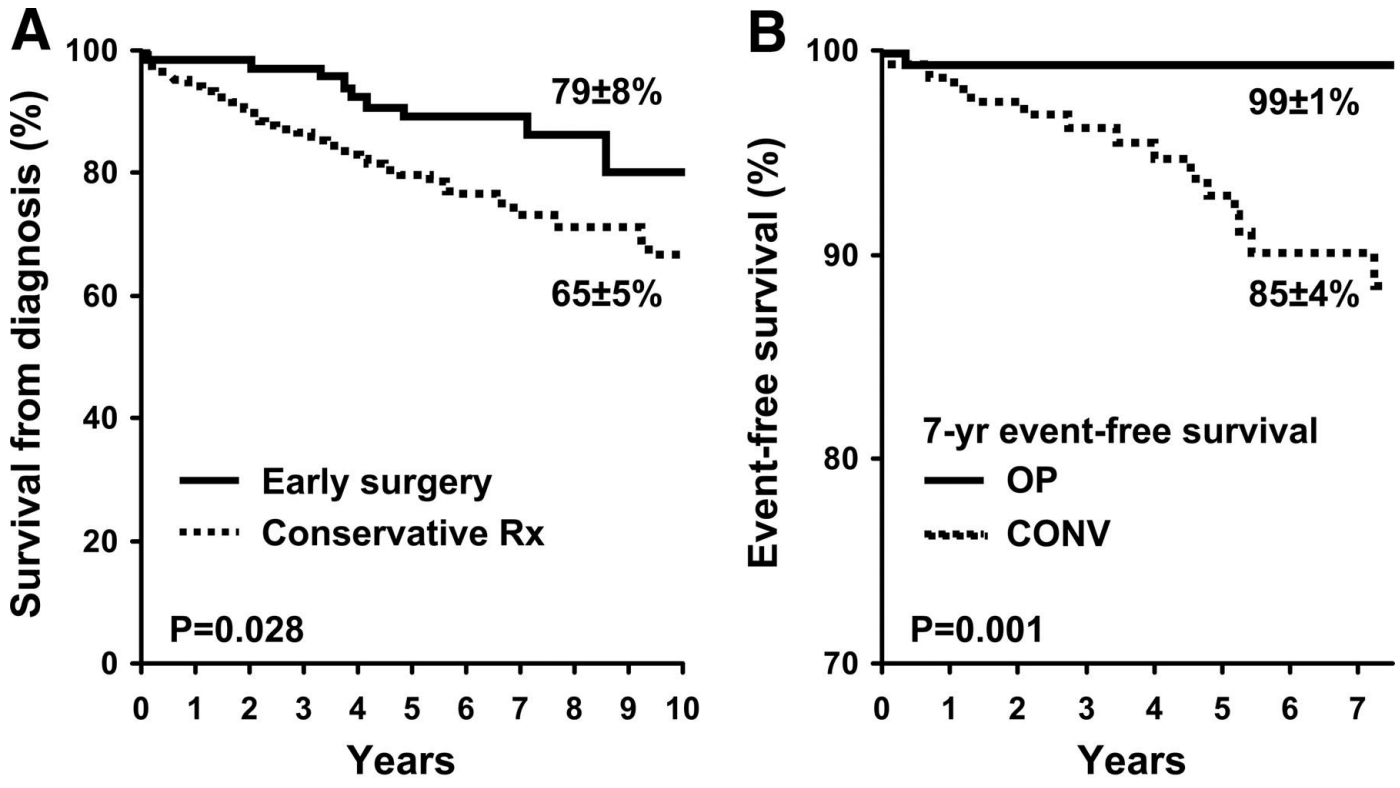


Fig. 7. Testing is achieved by injecting saline into the ventricular cavity.



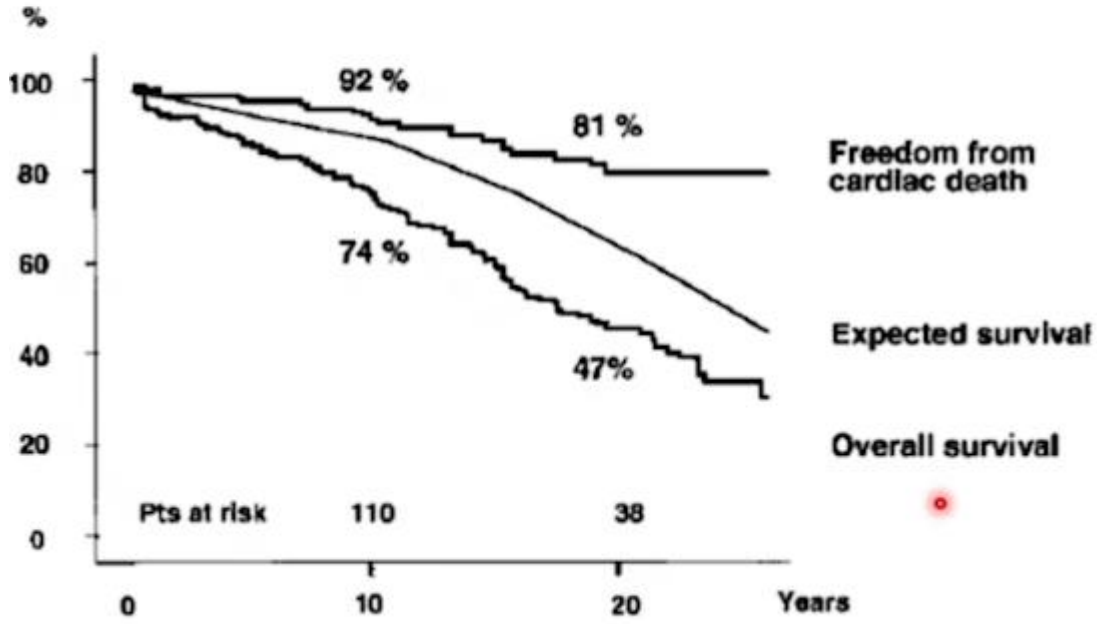
2 přístupy k léčbě mitrální regurgitace
Operační x konzervativní

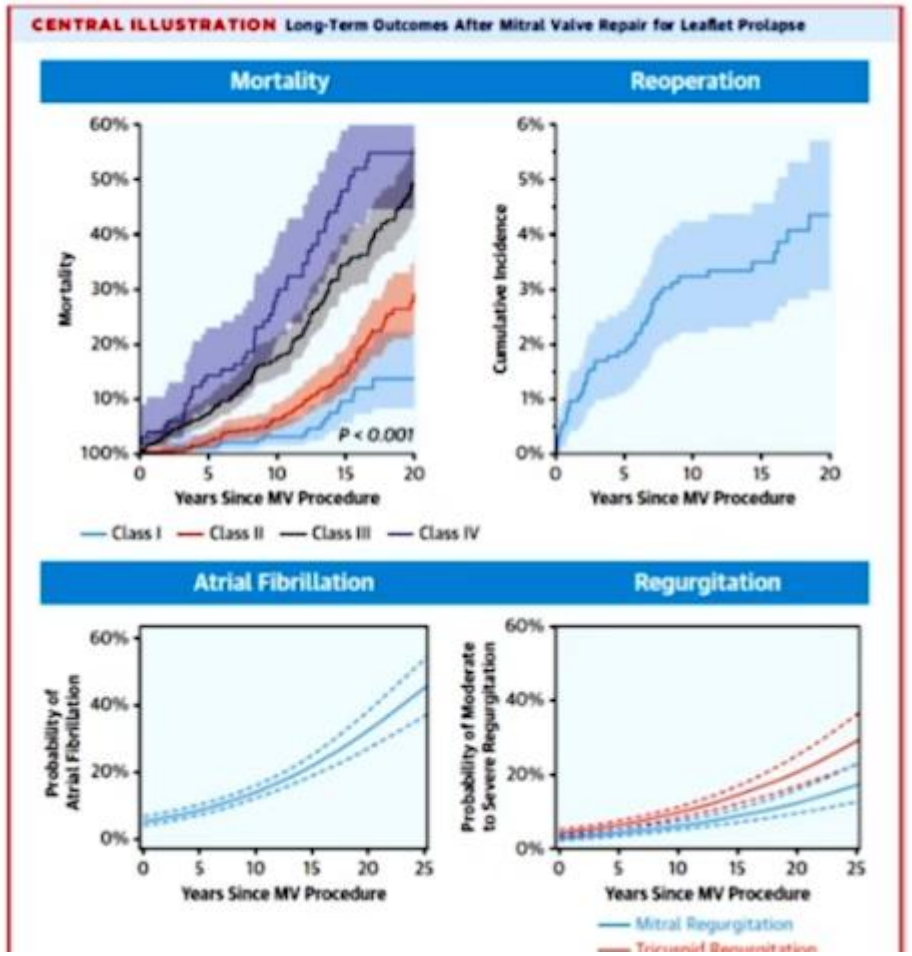


Chirurgické léčba mitrální regurgitace- MVP

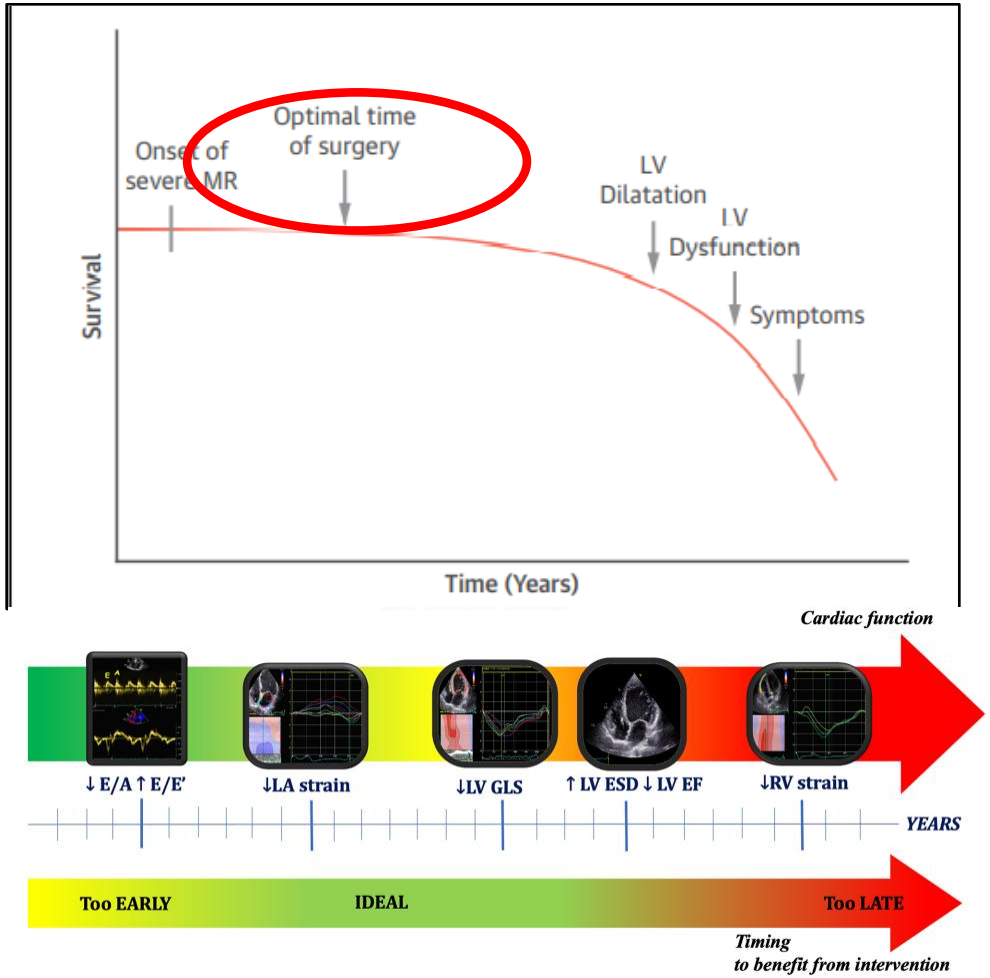
Very Long-Term Results (More Than 20 Years) of Valve Repair With Carpentier's Techniques in Nonrheumatic Mitral Valve Insufficiency

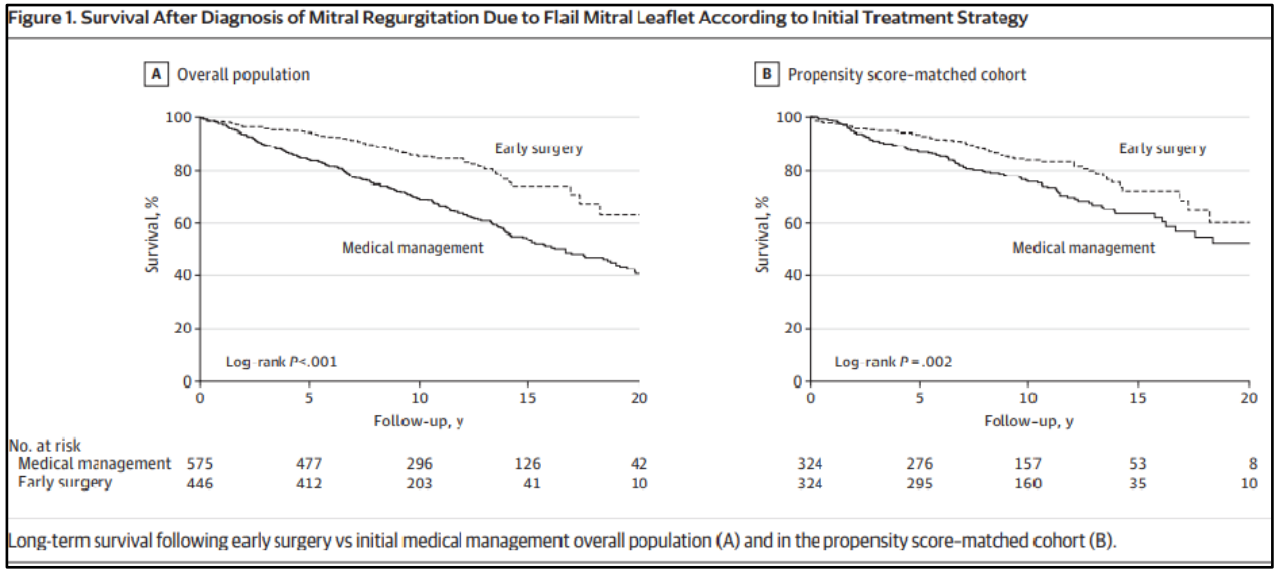
E. Braunberger, MD; A. Deloche, MD; A. Berrebi, MD; F. Abdallah, MD; J.A Celestin, MD; P. Meimoun, MD; G. Chatellier, MD; S. Chauvaud, MD; J.N. Fabiani, MD; A. Carpentier, MD





Primární mitrální regurgitace- kdy indikovat v operaci ?





Převzato a upraveno dle O´Gara, JACC 2020
M.C. Pastore Heart Failure Reviews (2022) 27:1247–1260

Mitrální regurgitace

Outcome and undertreatment of mitral regurgitation: a community cohort study

Volha Dziadzko [1], Marie-Annick Clavel [1], Mikhail Dziadzko [1], Jose R Medina-Inojosa [1], Hector Michelena [1], Joseph Maalouf [1], Vuyisile Nkomo [1], Prabin Thapa [1], Maurice Enriquez-Sarano [2]

1294 pacientů s ≥ středně významnou MR

	PMR	SMR
Operace /TEER	29%	5%
Medikamentózní léčba	71%	95%

Interpretation: In the community, isolated mitral regurgitation is common and is associated with excess mortality and frequent heart failure postdiagnosis in all patient subsets, even in those with normal left-ventricular ejection fraction and low comorbidity. Despite these poor outcomes, only a minority of affected patients undergo mitral (or any type of cardiac) surgery even in a community with all means of diagnosis and treatment readily available and accessible. This suggests that in a wider population there might be a substantial unmet need for treatment for this disorder.

Dziadzko, Lancet 2018

Contemporary Presentation and Management of Valvular Heart Disease: The EURObservational Research Programme Valvular Heart Disease II Survey

Bernard Iung [1], Victoria Delgado [2], Raphael Rosenhek [3], Susanna Price [4], Bernard Prendergast [5], Olaf Wendler [6], Michele De Bonis [7], Christophe Tribouilloy [8], Arturo Evangelista [9], Alexander Bogachev-Prokophiev [10], Astrid Apor [11], Hüseyin Ince [12], Cécile Laroche [13], Bogdan A Popescu [14], Luc Piérard [15], Michael Haude [16], Gerhard Hindricks [17], Frank Ruschitzka [18], Stefan Windecker [19], Jeroen J Bax [2], Aldo Maggioni [13], Alec Vahanian [20], EORP VHD II Investigators

1114 pacientů s významnou MR

	PMR	SMR
Operace /TEER	37%	25%
Medikamentozní léčba	63%	75%

Conclusions: Despite good concordance between Class I recommendations and practice in patients with aortic VHD, the suboptimal number in mitral VHD and late referral for valvular interventions suggest the need to improve further guideline implementation.

Iung, Circulation 2019

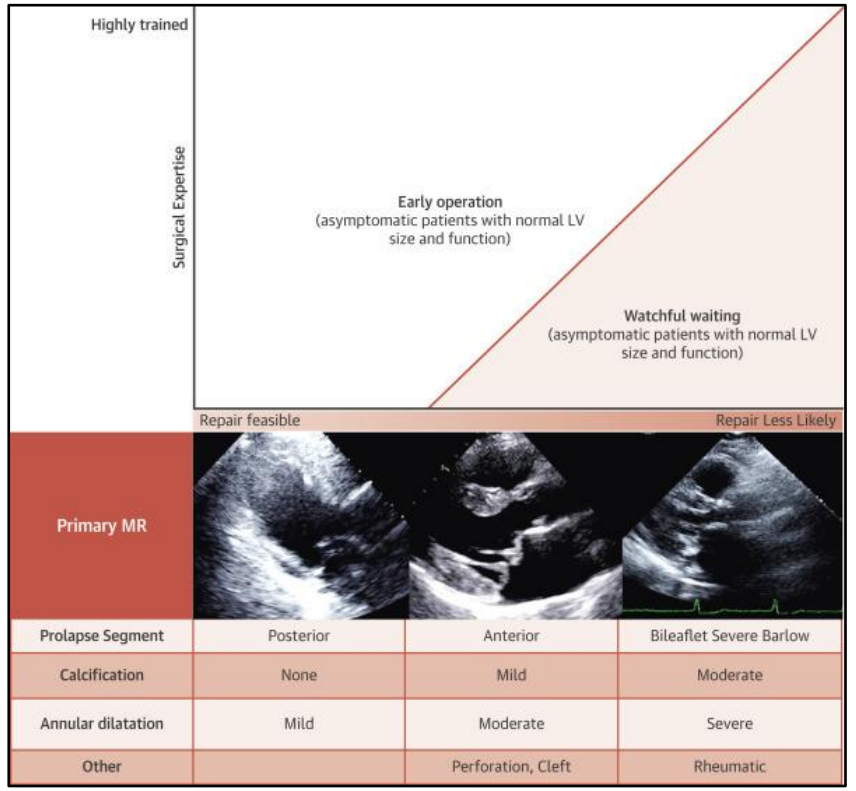
Morfologie mitrální chlopně –pravděpodobnost proveditelnosti MVP

	Ideal Pathoanatomy	Challenging Pathoanatomy	Relative Pathoanatomic Contraindication
Primary Lesion Location	Posterior leaflet only	Anterior leaflet or bileaflet	None
Leaflet Calcification	None	Mild	Moderate to severe
Annular Calcification	None	Mild to moderate with minimal leaflet encroachment	Severe or with significant leaflet encroachment
Subvalvular Apparatus	Thin, normal	Mild diffuse thickening or moderate focal thickening	Severe and diffuse thickening with leaflet retrac
Mechanism of MR	Type II fibroelastic deficiency or focal myxomatous prolapse or flail	Type II *forme fruste* or bileaflet myxomatous (Barlow's) disease; Type I healed or active endocarditis; Type IIIA/B with mild restriction or leaflet thickening	Type IIIB with severe tethering and inferobasal aneurysm; Type IIIA with severe bileaflet calcification; Type I active infection with se leaflet or annular tissue destruction
Unique Anatomic Complexities	None	Redo cardiac operation or mitral re-repair; anatomic predictors of systolic anterior motion (e.g., septal hypertrophy); adult congenital anomalies; focal papillary muscle rupture	MV reoperation with paucity of leaflet tissue; diffuse radiation valvulopathy; papillary mu rupture with shock

„Easy“

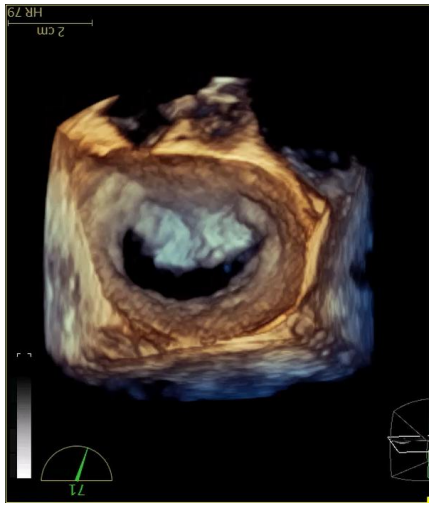
Proveditelné zkušenějším týmem

Obtížné nebo nemožné

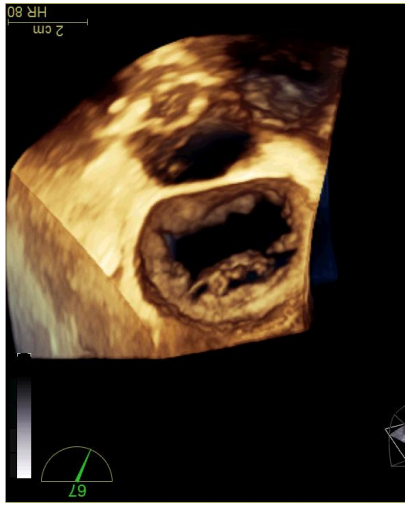


Převzato a upraveno dle O´Gara, JACC 2020

Morfologie mitrální chlopně 3D echo



sekundární MR

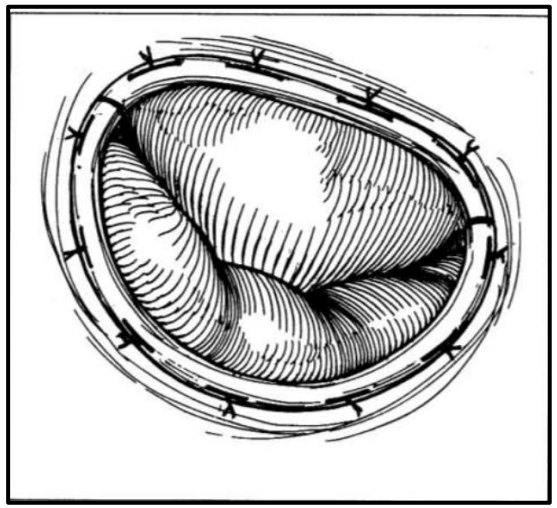


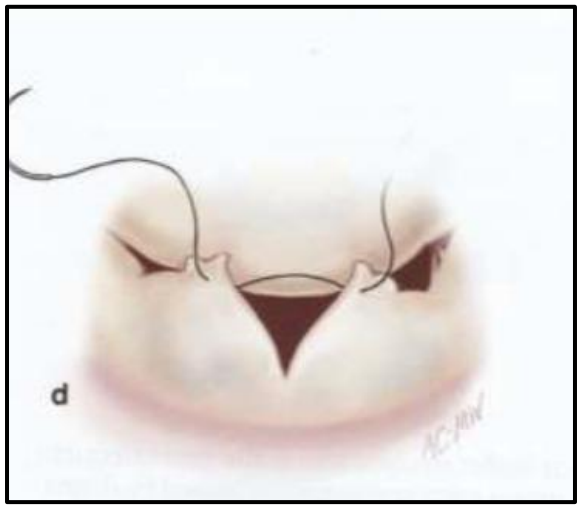
patologie na zadním cípu

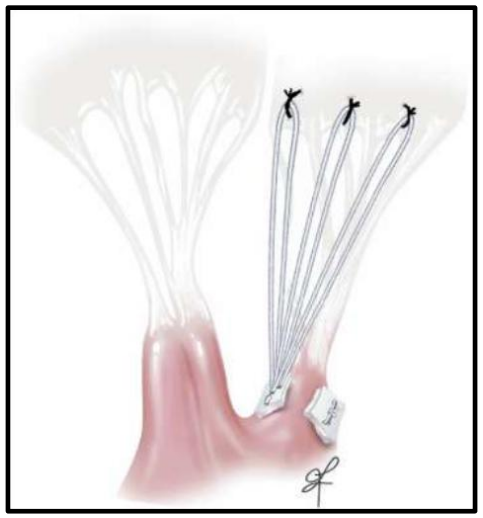
patologie na předním cípu

patologie na předním cípu
PM komisura

Moderní chirurgické postupy v léčbě mitrální regurgitace





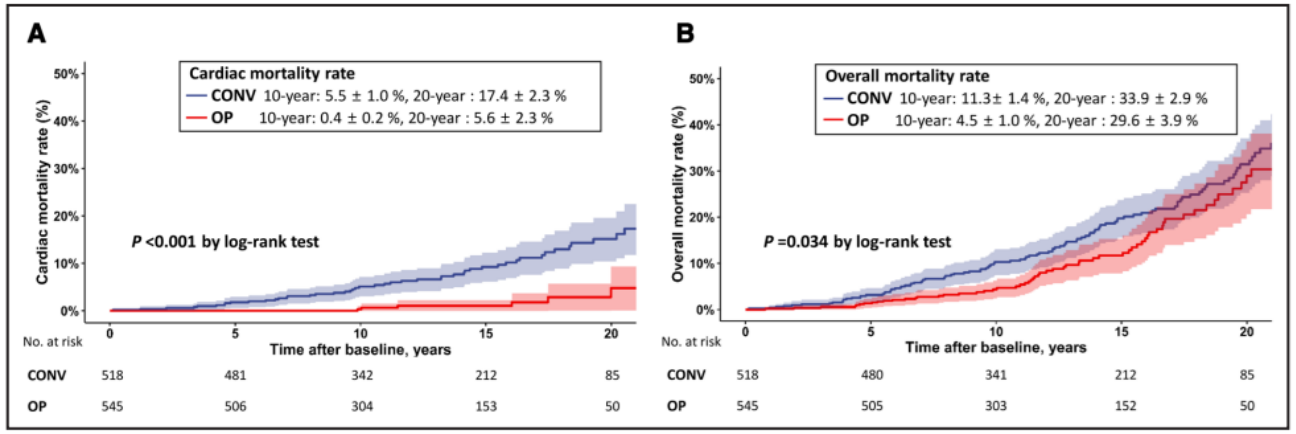


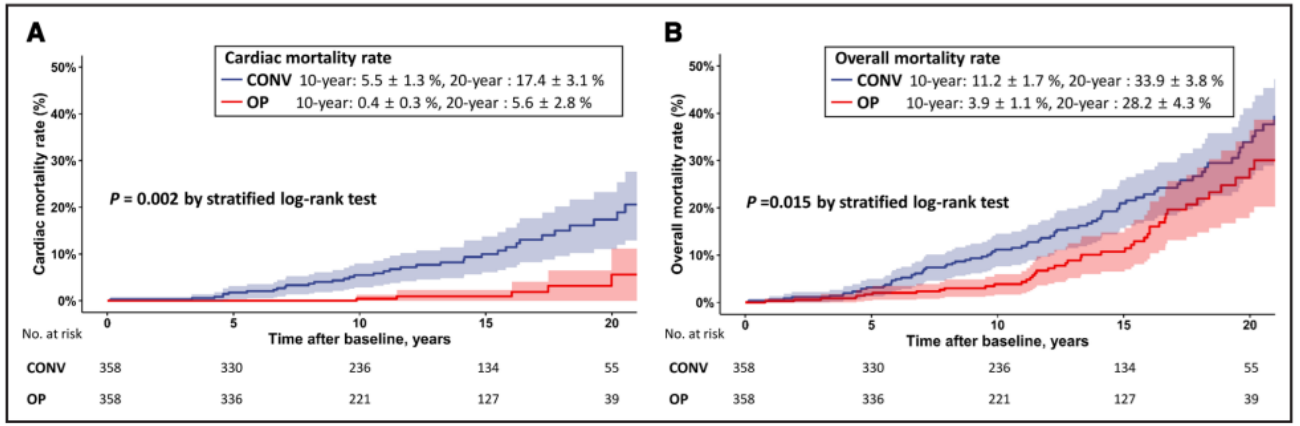
Repair

Resect

Respect

Časná operace u primární mitrální regurgitace

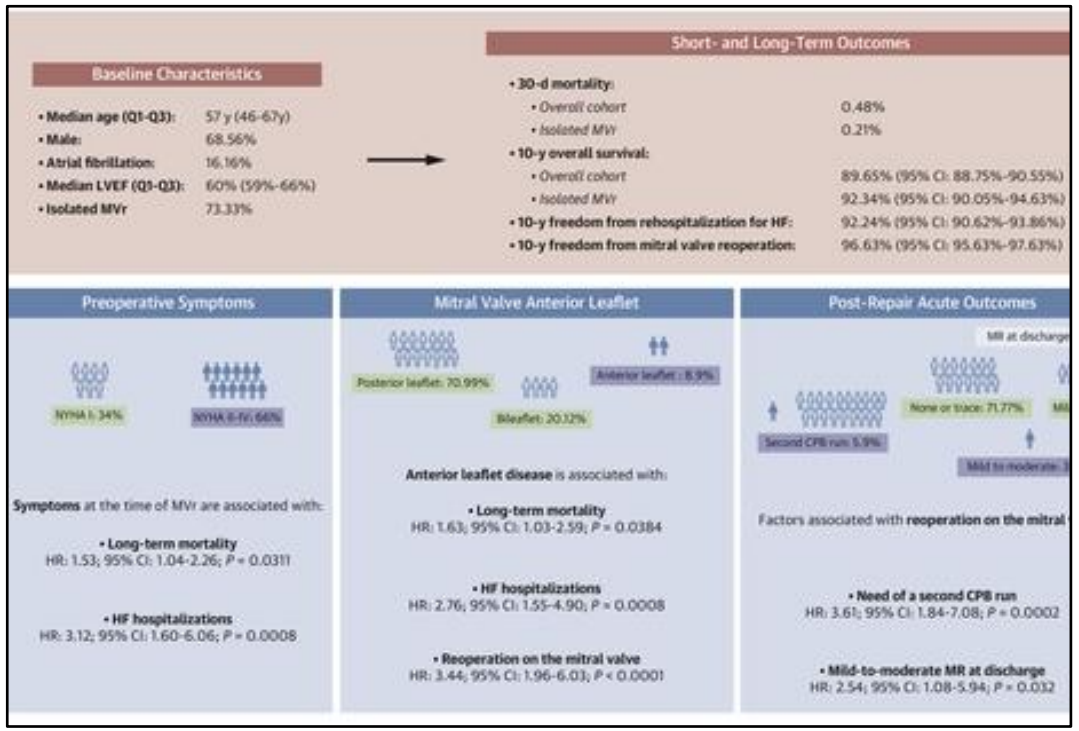




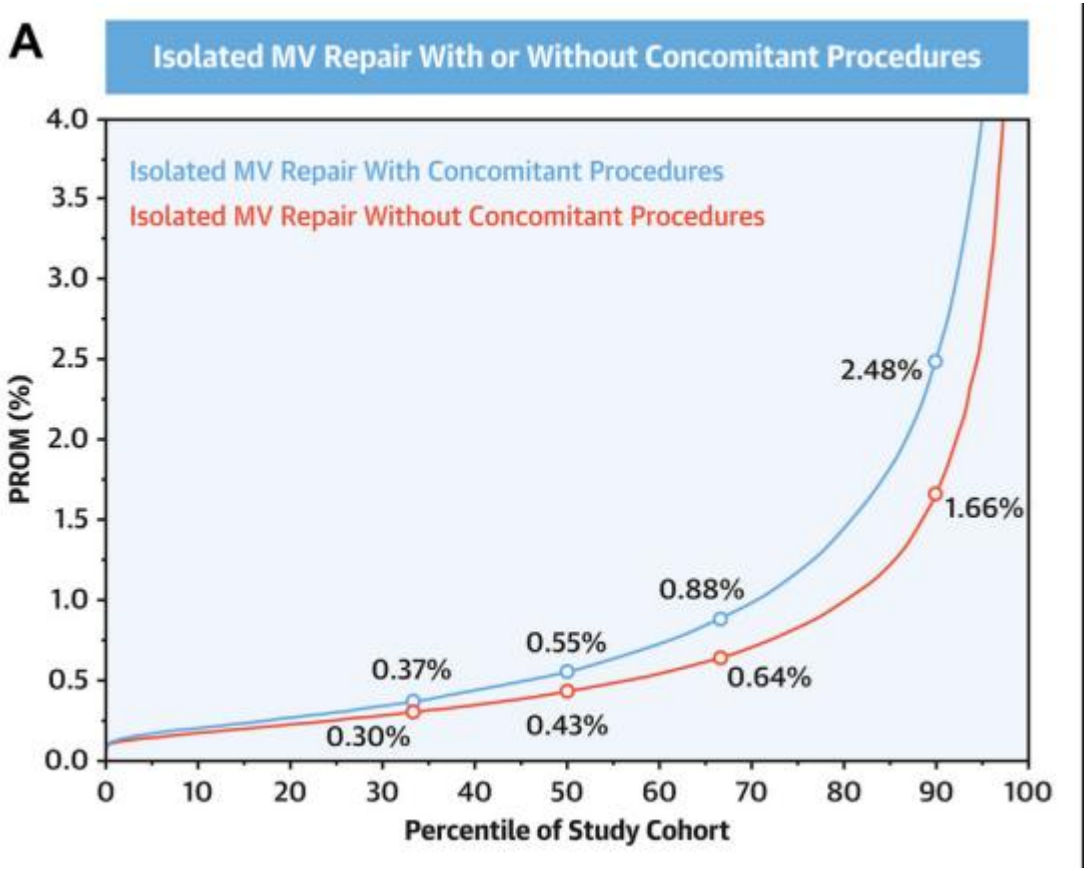
Převzato a upraveno Park et al, Circulation, 2025;152:1209–1217.

PMR – strategie léčby

Long-Term Outcomes of Contemporary Surgical Repair for Degenerative Mitral Regurgitation

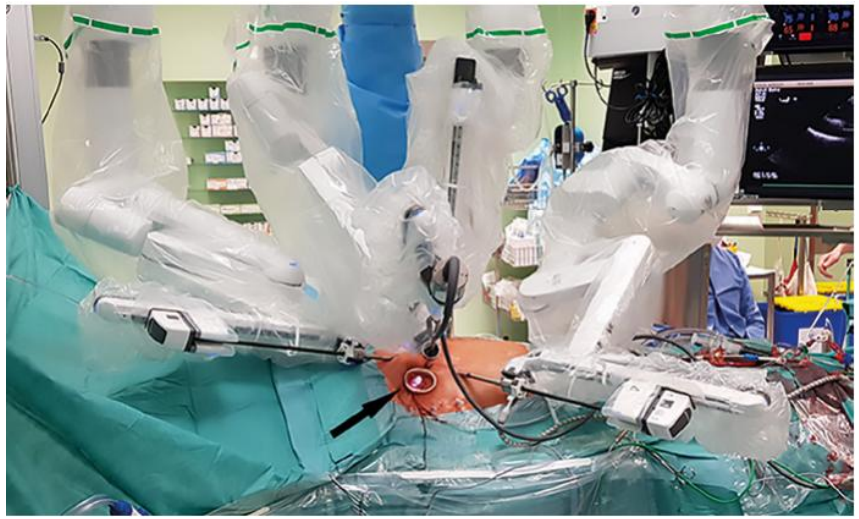


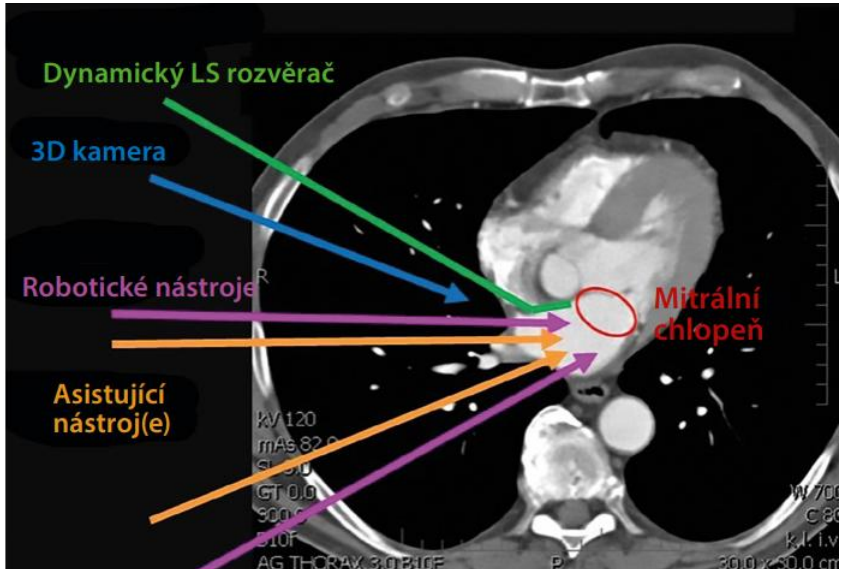
Risk of Surgical Mitral Valve Repair for Primary Mitral Regurgitation



Převzato a upraveno dle Benedetto Del Forno et al. *JACC* 2025; 85:835-847., Vinay Badhwar, MD et al. Ann Thorac Surg 2023;115:600-10)

PMR- současné možnosti léčby





JAMA

QUESTION Is minimally invasive mitral valve repair better at improving physical function at 12 weeks than conventional sternotomy mitral valve repair for degenerative mitral regurgitation?

CONCLUSION Minithoracotomy is not superior to sternotomy in recovery of physical function at 12 weeks. The results provide evidence to inform shared decision-making and treatment guidelines.

POPULATION

229 Men
100 Women

Adults with degenerative mitral regurgitation undergoing mitral valve repair surgery

Mean age: 67 years

LOCATIONS

10
Tertiary care institutions in the UK

INTERVENTION

330 Patients randomized
294 Patients analyzed

166
Minithoracotomy
A 4- to 7-cm right lateral minithoracotomy and thoracoscopic guidance

164
Sternotomy
Complete division of the sternum according to standard technique

PRIMARY OUTCOME

Change in physical functioning and return to usual activities from baseline at 12 weeks after surgery measured by the 36-Item Short Form Health Survey version 2 physical functioning T score

FINDINGS

Mean change in score from baseline

Minithoracotomy
7.62 (95% CI, 5.49 to 9.78)

Sternotomy
7.20 (95% CI, 5.04 to 9.35)

The primary analysis did not demonstrate superiority of minithoracotomy vs sternotomy:
Mean difference, 0.68
(95% CI, −1.89 to 3.26)

Převzato a upraveno dle Akowuah EF, JAMA 2023;329;(22):1957-1966
Černý Š.; Interv Akut Kardiol. 2023;22(1):17-26

Sekundární mitrální regurgitace - strategie léčby

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Two-Year Outcomes of Surgical Treatment of Severe Ischemic Mitral Regurgitation

D. Goldstein, A.J. Moskowitz, A.C. Gelijns, G. Ailawadi, M.K. Parides, L.P. Perrault, J.W. Hung, P. Voisine, F. Dagenais, A.M. Gillinov, V. Thourani, M. Argenziano, J.S. Gammie, M. Mack, P. Demers, P. Atluri, E.A. Rose, K. O'Sullivan, D.L. Williams, E. Bagiella, R.E. Michler, R.D. Weisel, M.A. Miller, N.L. Geller, W.C. Taddei-Peters, P.K. Smith, E. Moquete, J.R. Overbey, I.L. Kron, P.T. O'Gara, and M.A. Acker, for the CTSN*

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 DECEMBER 13, 2018 VOL. 379 NO. 24

Percutaneous Repair or Medical Treatment for Secondary Mitral Regurgitation

J.-F. Obadia, D. Messika-Zeitoun, G. Leurent, B. Iung, G. Bonnet, N. Piriou, T. Lefèvre, C. Piot, F. Rouleau, D. Carrié, M. Nejjari, P. Ohlmann, F. Leclercq, C. Saint Etienne, E. Teiger, L. Leroux, N. Karam, N. Michel, M. Gilard, E. Donal, J.-N. Trochu, B. Cormier, X. Armoiry, F. Boutitie, D. Maucort-Boulch, C. Barnel, G. Samson, P. Guerin, A. Vahanian, and N. Mewton, for the MITRA-FR Investigators*

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Two-Year Outcomes of Surgical Treatment of Moderate Ischemic Mitral Regurgitation

R.E. Michler, P.K. Smith, M.K. Parides, G. Ailawadi, V. Thourani, A.J. Moskowitz, M.A. Acker, J.W. Hung, H.L. Chang, L.P. Perrault, A.M. Gillinov, M. Argenziano, E. Bagiella, J.R. Overbey, E.G. Moquete, L.N. Gupta, M.A. Miller, W.C. Taddei-Peters, N. Jeffries, R.D. Weisel, E.A. Rose, J.S. Gammie, J.J. DeRose, Jr., J.D. Puskas, F. Dagenais, S.G. Burks, I. El-Hamamsy, C.A. Milano, P. Atluri, P. Voisine, P.T. O'Gara, and A.C. Gelijns, for the CTSN*

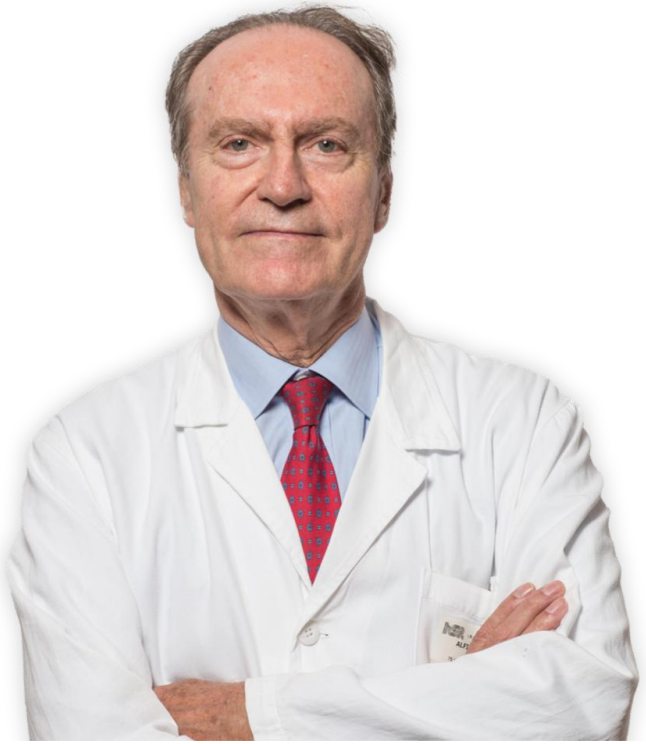
The NEW ENGLAND JOURNAL of MEDICINE

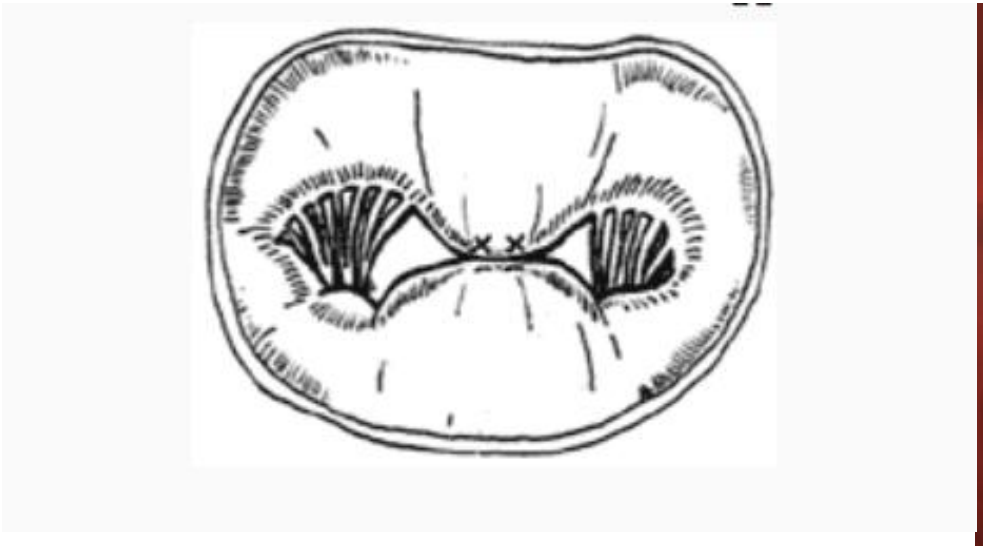
ORIGINAL ARTICLE

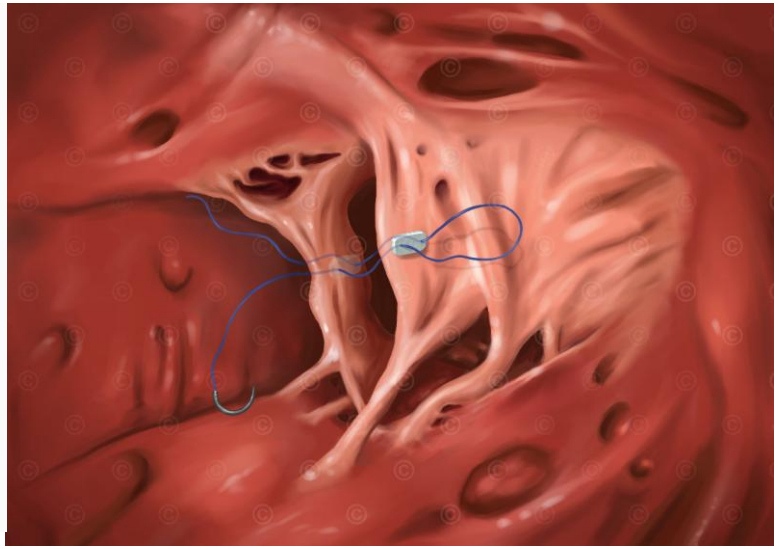
Transcatheter Mitral-Valve Repair in Patients with Heart Failure

G.W. Stone, J.A. Lindenfeld, W.T. Abraham, S. Kar, D.S. Lim, J.M. Mishell, B. Whisenant, P.A. Grayburn, M. Rinaldi, S.R. Kapadia, V. Rajagopal, I.J. Sarembock, A. Brieke, S.O. Marx, D.J. Cohen, N.J. Weissman, and M.J. Mack, for the COAPT Investigators*

1991







Historie katetrizační léčby mitrální regurgitace

1990s

Alfieri

Chirurgický edge-to-edge repair
inspirace pro perkutánní léčbu

2003

První MitraClip

První perkutánní edge-to-edge implantace u člověka

2005–10

EVEREST

Proveditelnost, bezpečnost a srovnání s chirurgií

2018

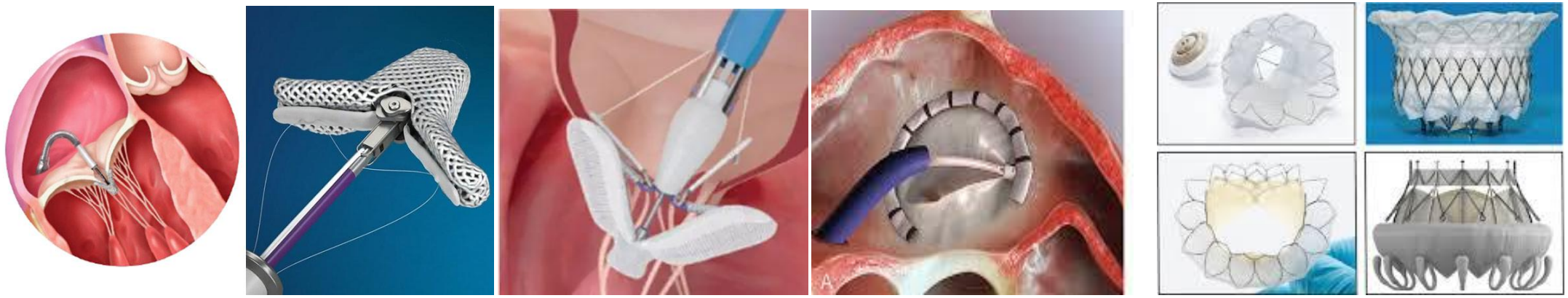
COAPT / MITRA-FR

Zásadní data u sekundární MR
význam správné selekce pacientů

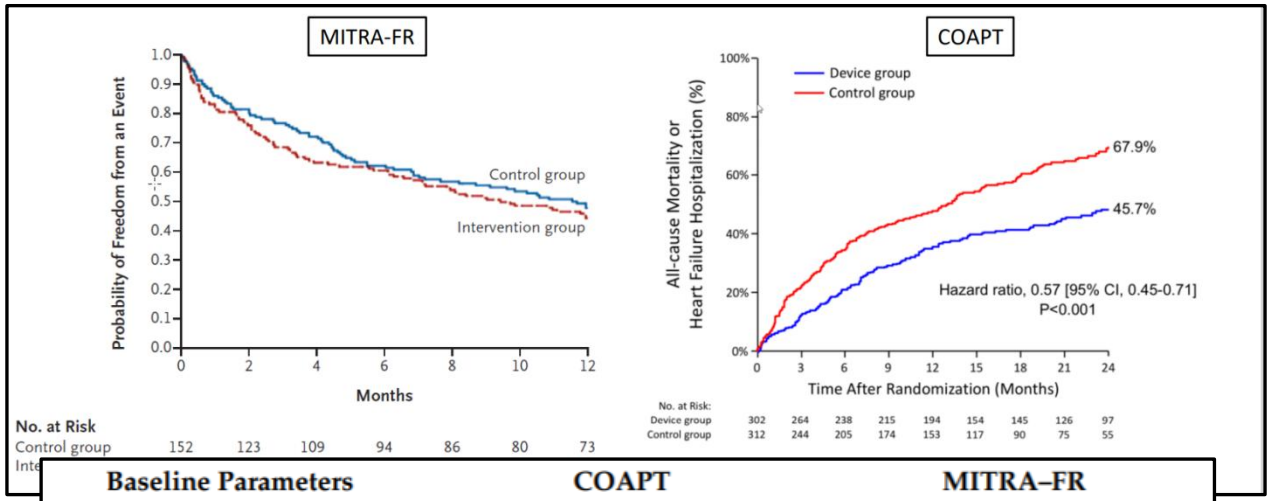
2020s→

TEER + TMVR

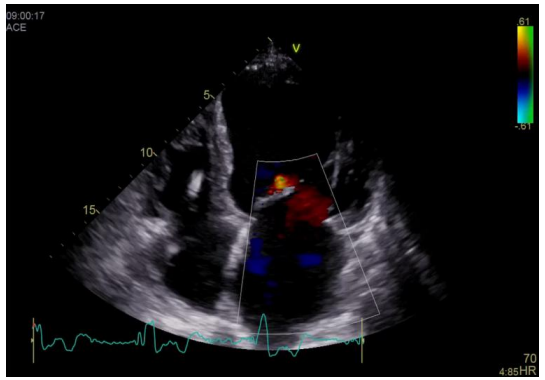
MitraClip / PASCAL
rozvoj transkatétrové náhrady

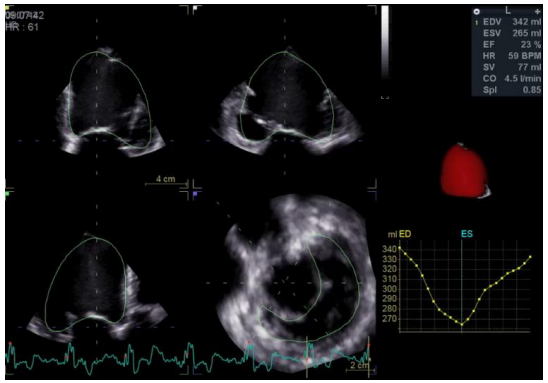


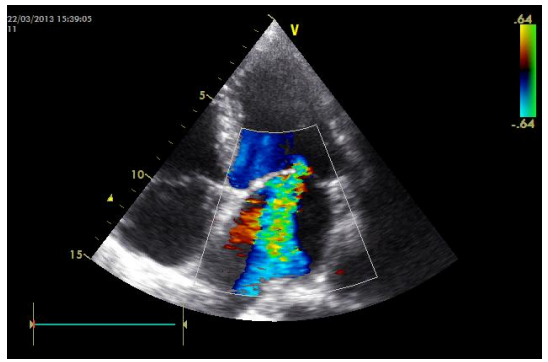
Sekundární mitrální regurgitace strategie léčby- 2018

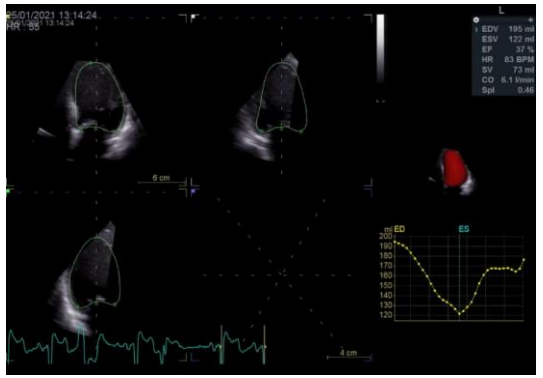


Baseline Parameters	COAPT	MITRA–FR
Etiology of LV dysfunction		
Ischemic	60.7%	59.6%
Non-ischemic	39.3%	40.4%
LVEDV	101 ± 34 mL/m^2	135 ± 35 mL/m^2
LVEF inclusion criteria	>20%, <50%	>15%, <40%
Mean LVEF	31% ± 9%	33 ± 7%
EROA cutoff	>30 mm^2	>20 mm^2
Mean EROA	41 ± 15 mm^2	31 ± 10 mm^2
EROA > 30 mm^2	86%	48%
Additional criteria	LVESD < 70 mm sPAP < 70 mmHg RV dysfunction < moderate	









Proporcionální a disproporcionální MR – kdy je pacient vhodný k MitraClip ?

1. Těžká symptomatická primární MR u inoperabilního pacienta
2. Sekundární MR u pacienta s:
   - Symptomy přes optimální farmakoterapii a přístrojovou léčbu
   - Systolická dysfunkce levé komory s EF 20-50% a LVESD ≤70mm
   - Těžkou MR „inadekvátní“ k míře remodelace levé komory
   - Inoperabilní dle Heart team

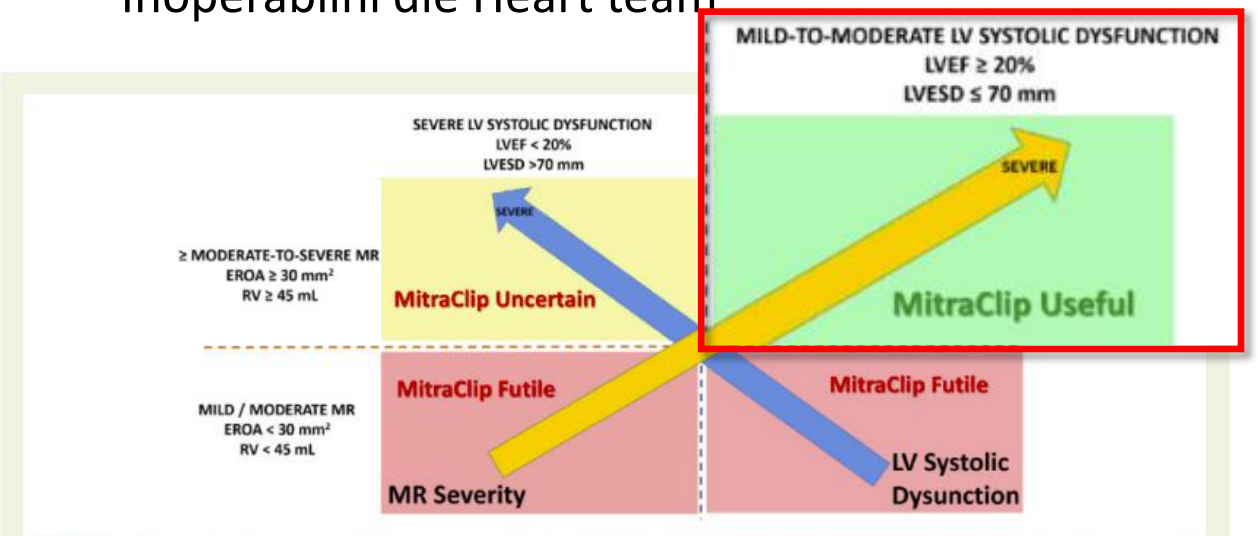
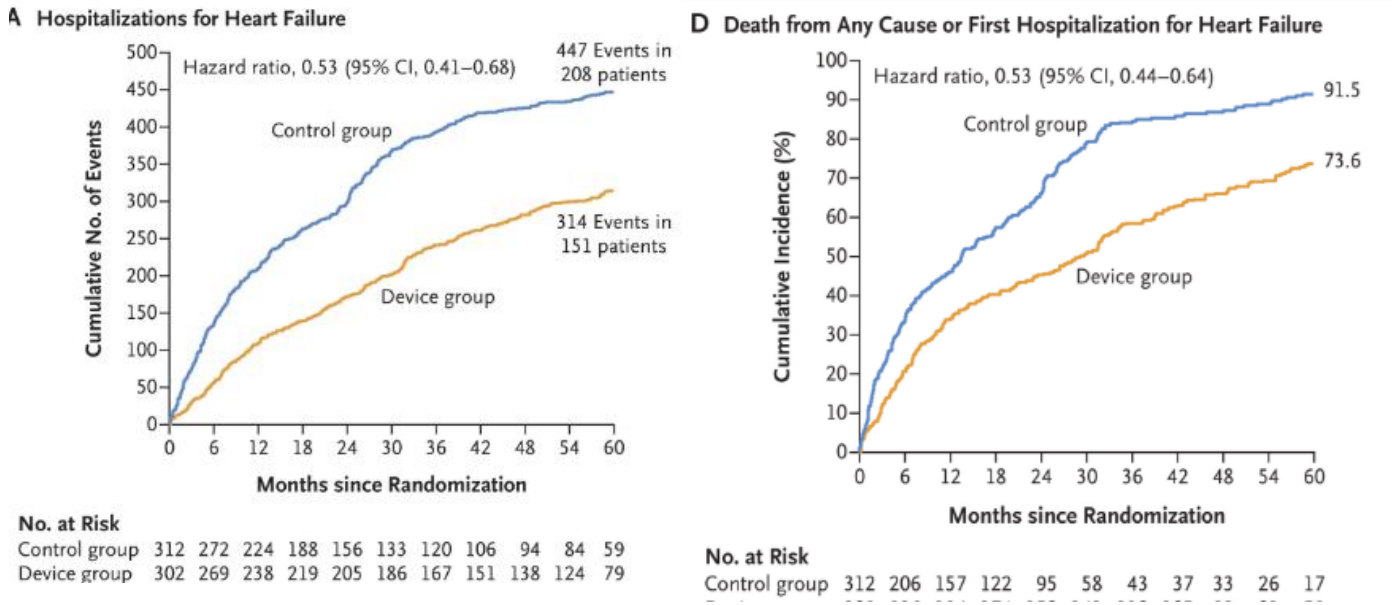


Figure 1 Utility vs. futility of MitraClip procedure according to severity of MR and LV systolic dysfunction. EROA, effective regurgitant orifice area; LVEF, left ventricular ejection fraction; LVESD, left ventricular end-systolic diameter; MR, mitral regurgitation; RV, regurgitant volume.

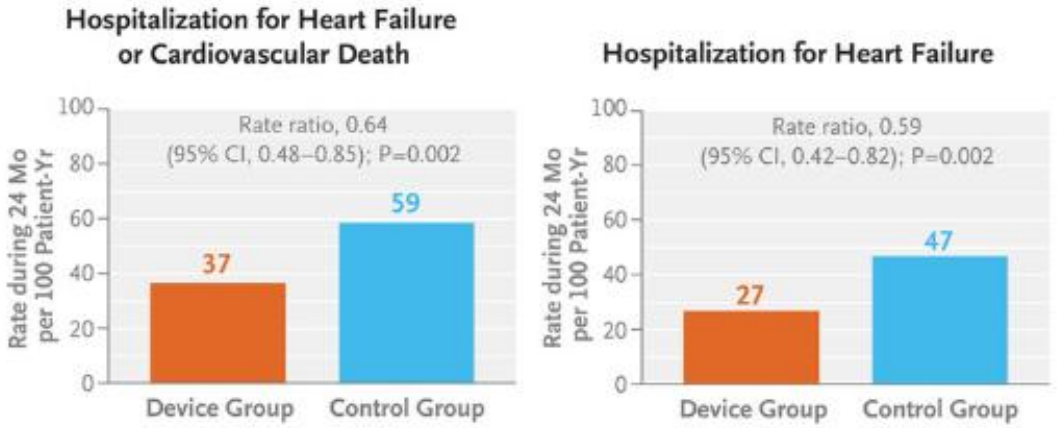
Pibarot, P. et al. Eur H Journal. 2019

Ventrikulární SMR - klíčové studie

COAPT



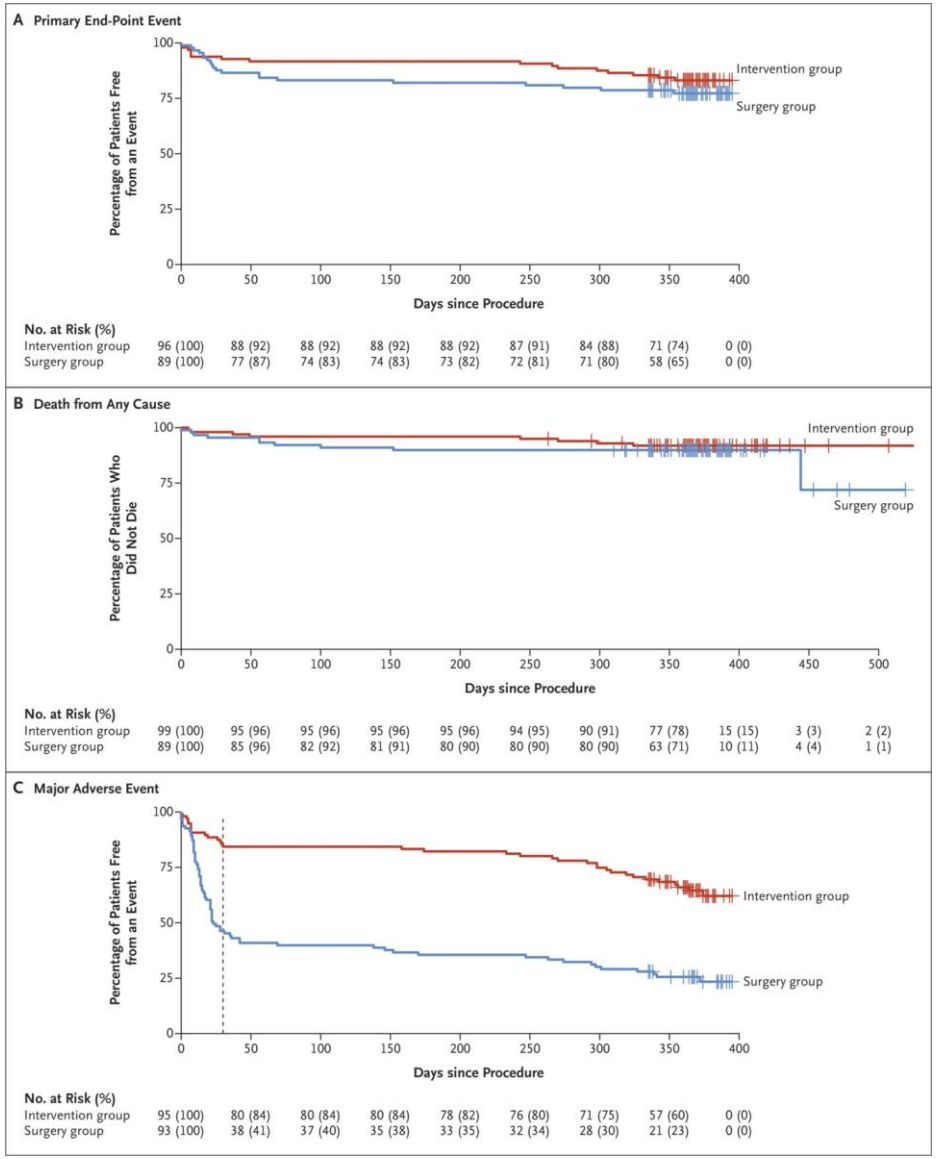
RESHAPE



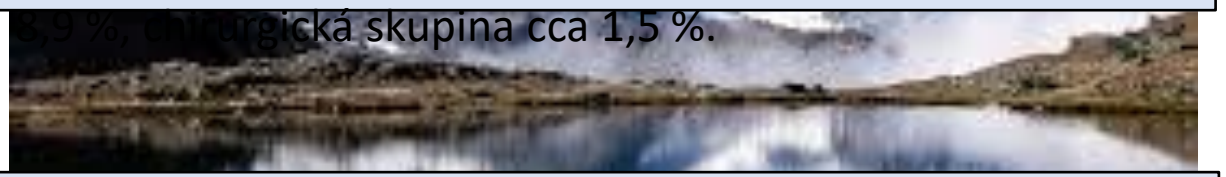
- COAPT (2018, 5leté výsledky 2023): - TEER + GDMT ↓ mortalitu a hospitalizace HF
- MITRA-FR (2018): - bez benefitů (pokročilejší LV dilatace, méně disproporcionální MR)
- RESHAPE-HF2 (2024): - TEER + GDMT ↓ hospitalizace HF, zlepšení QoL
- Registry (COAPT-PAS, EuroSMR): - Potvrzení efektu v reálné praxi

Převzato a upraveno dle Stone GW, N Engl J Med 2023;388:2037-2048, Anker SD, N Engl J Med 2024;391:1799-1809

Sekundární mitrální regurgitace



- **Primární composite endpoint**: úmrtí pro jakoukoli příčinu, hospitalizace pro HF, re-intervence chlopně , CMP po 1 roce:
  TEER skupina: 16,7 %, **Chirurgická skupina**: 22,5 % - tj. splněna noninferiorita pro TEE
- **Bezpečnostní endpoint (30 dní)**: TEER: ~14,9 % vs chirurgická skupina ~54,8 %.
- **Rekurence MR ≥ 3+ po 1 roce**: TEER skupina cca 8,9 %, chirurgická skupina cca 1,5 %.



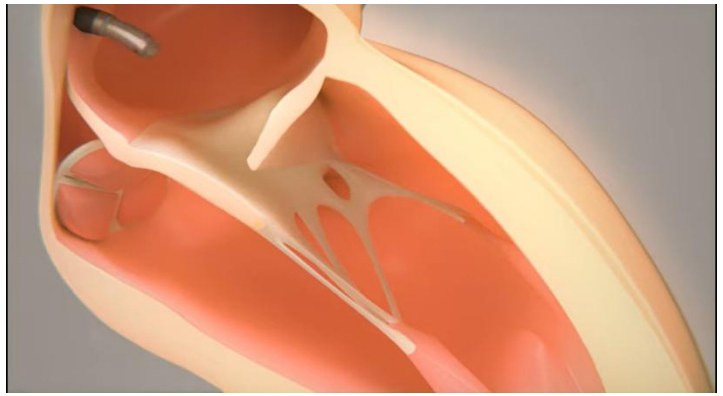
- MATTERHORN -u některých pacientů se SMR může být **TEER** alternativou k operaci, srovnatelnou účinností a s lepší bezpečnostní zvl. u pacientů s vyšším KCH rizikem.
- Subanalýza pro **ASMR** - TEER může být u této skupiny též použitelný, ovšem s opatrností vzhledem k vyšší míře recidivy MR; výhoda v bezpečnosti je výrazná.

Převzato a upraveno dle Baldus S, N Engl J Med 2024;391:1787-1798

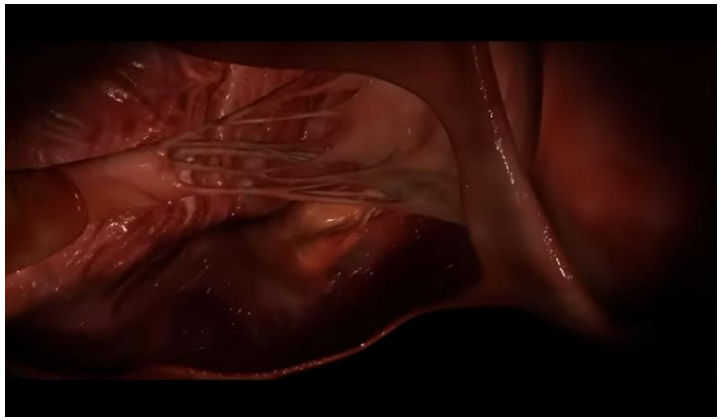
Současné možnosti katetrizační léčby

TEER- MitraClip

Neochordy



Biologická náhrada



Vývoj transkatétrové léčby u MR

1 TEER

- Edge-to-edge repair bez sternotomie
- MitraClip → více generací systému
- PASCAL jako další platforma
- DMR , sekundární MR

2 Další repair technologie

- Transkatétrová anuloplastika
- Chordální / leaflet technologie
- Snaha napodobit chirurgickou rekonstrukci
- Výběr podle anatomie a mechanismu

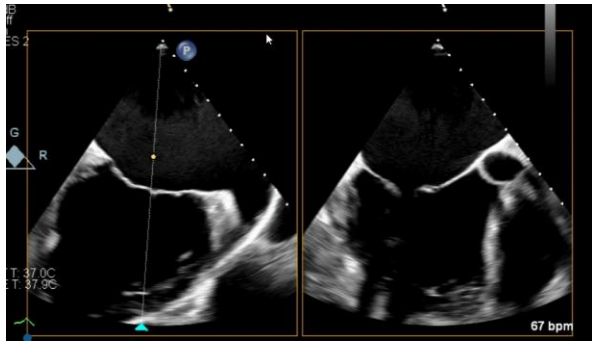
3 TMVR

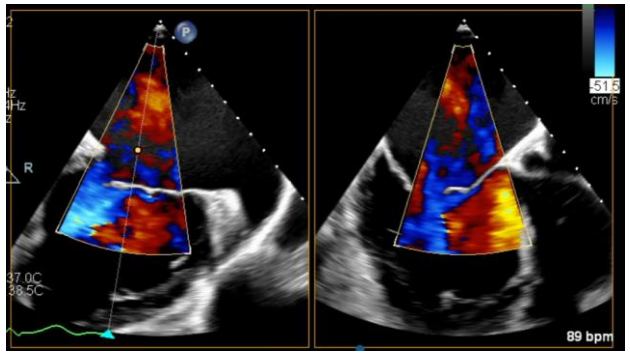
- Transkatétrová náhrada mitrální chlopně
- Řešení anatomie nevhodné pro repair
- Výzvy: LVOT, velikost anulu, kotvení
- Rychle se rozvíjející oblast

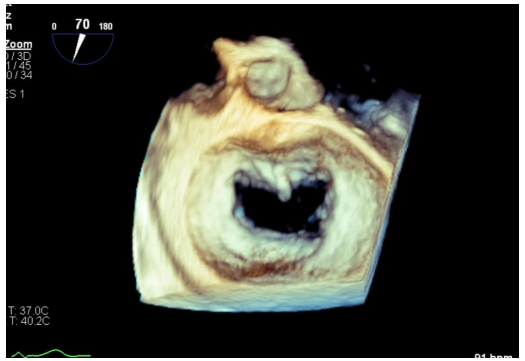
Katetrizační léčba se posunula od alternativy pro neoperabilní pacienty k etablované součásti Heart Team strategie.

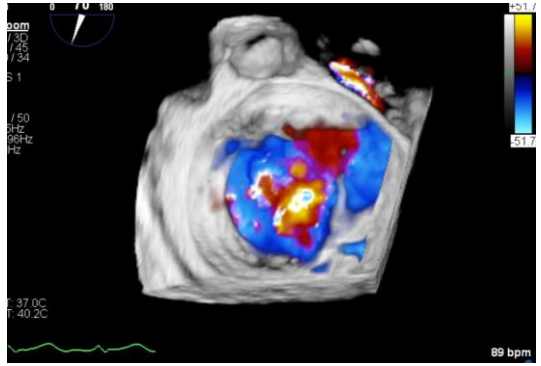
Budoucnost: individualizace podle mechanismu MR, anatomie, komorové odpovědi a očekávané durability.

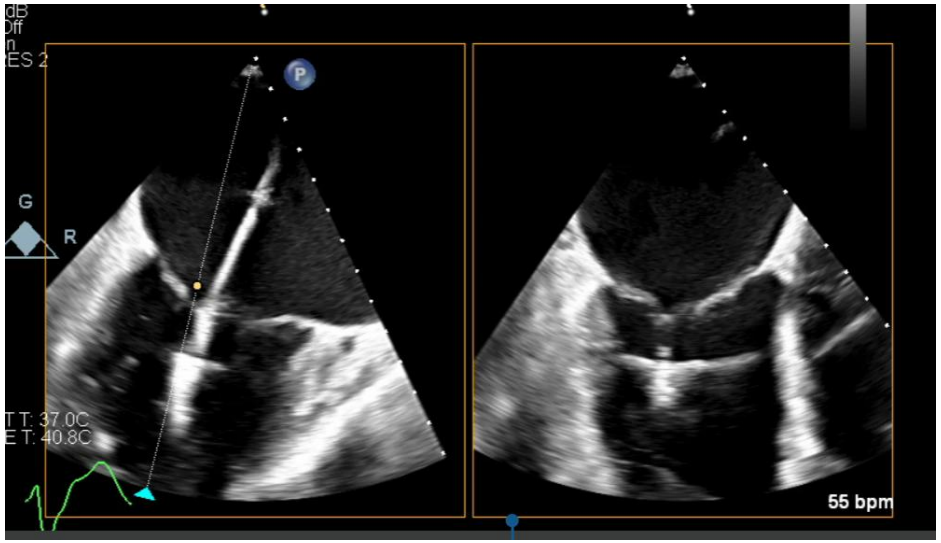
Mitraclip

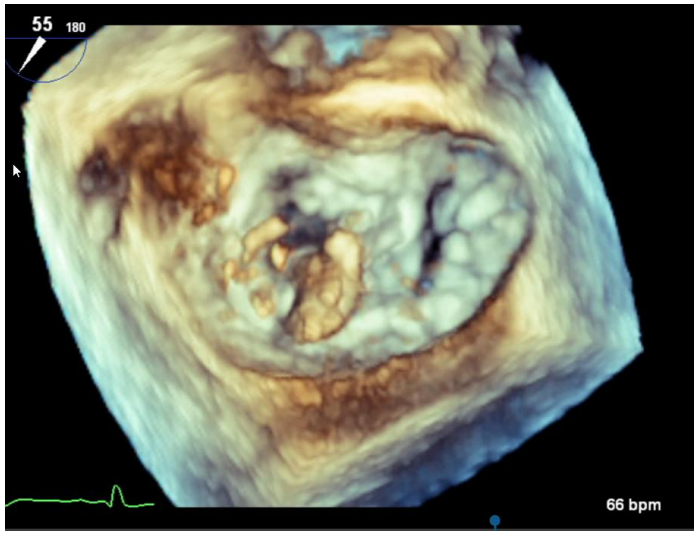


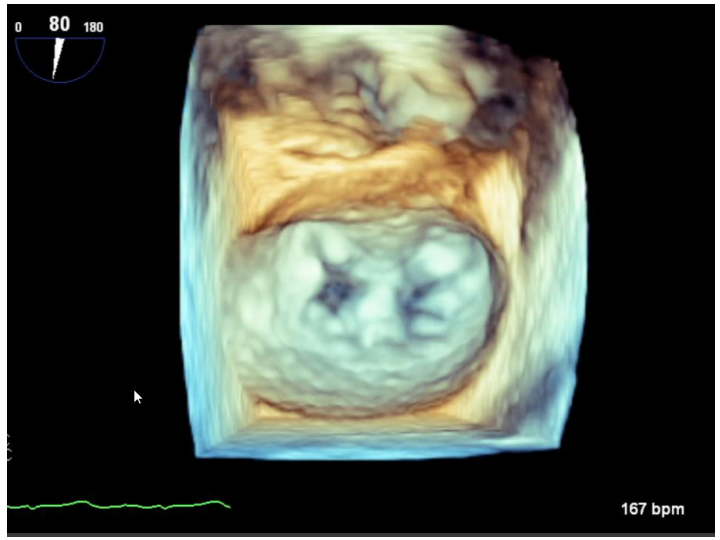




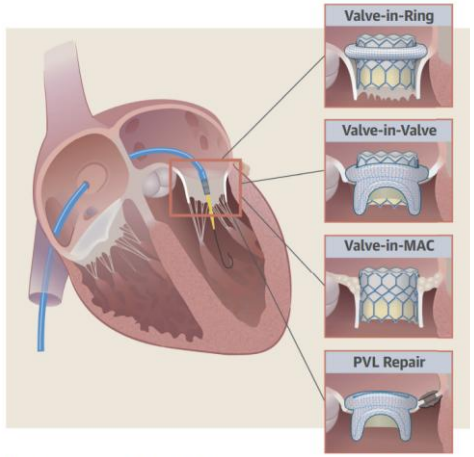


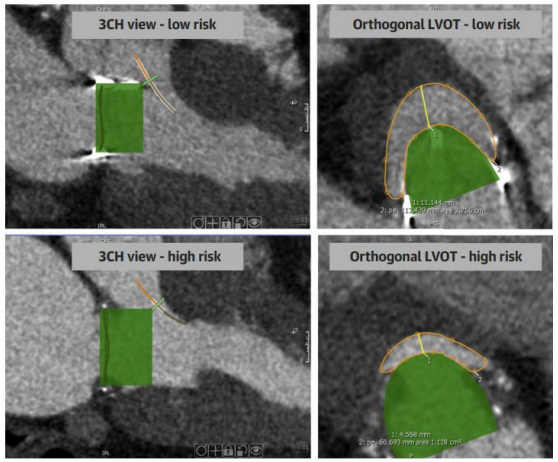


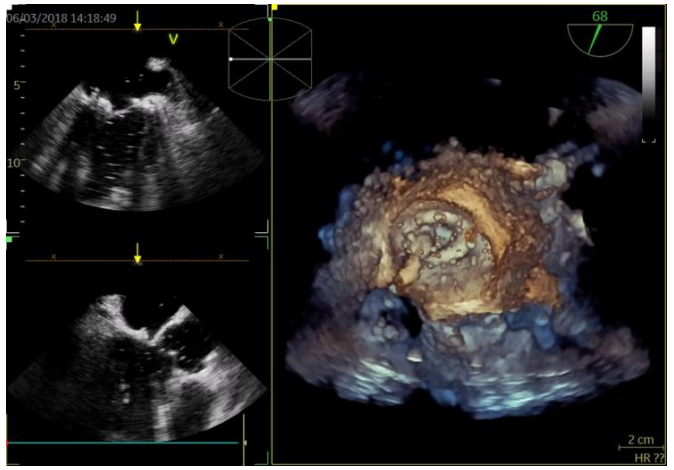


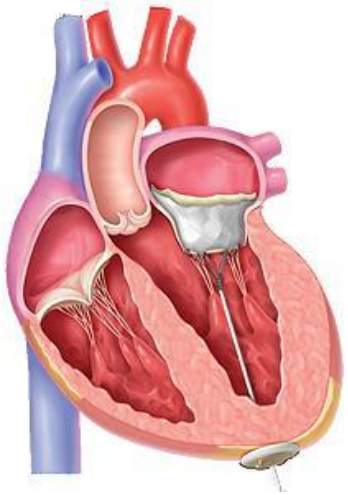


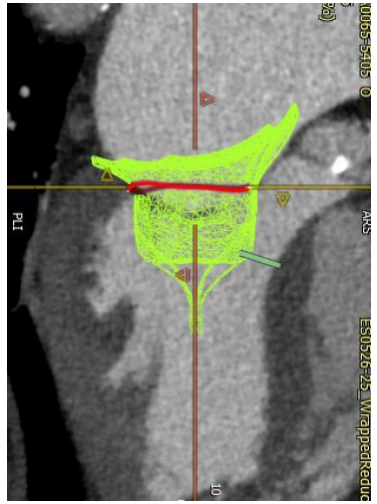
Katetrizační náhrady mitrální chlopně





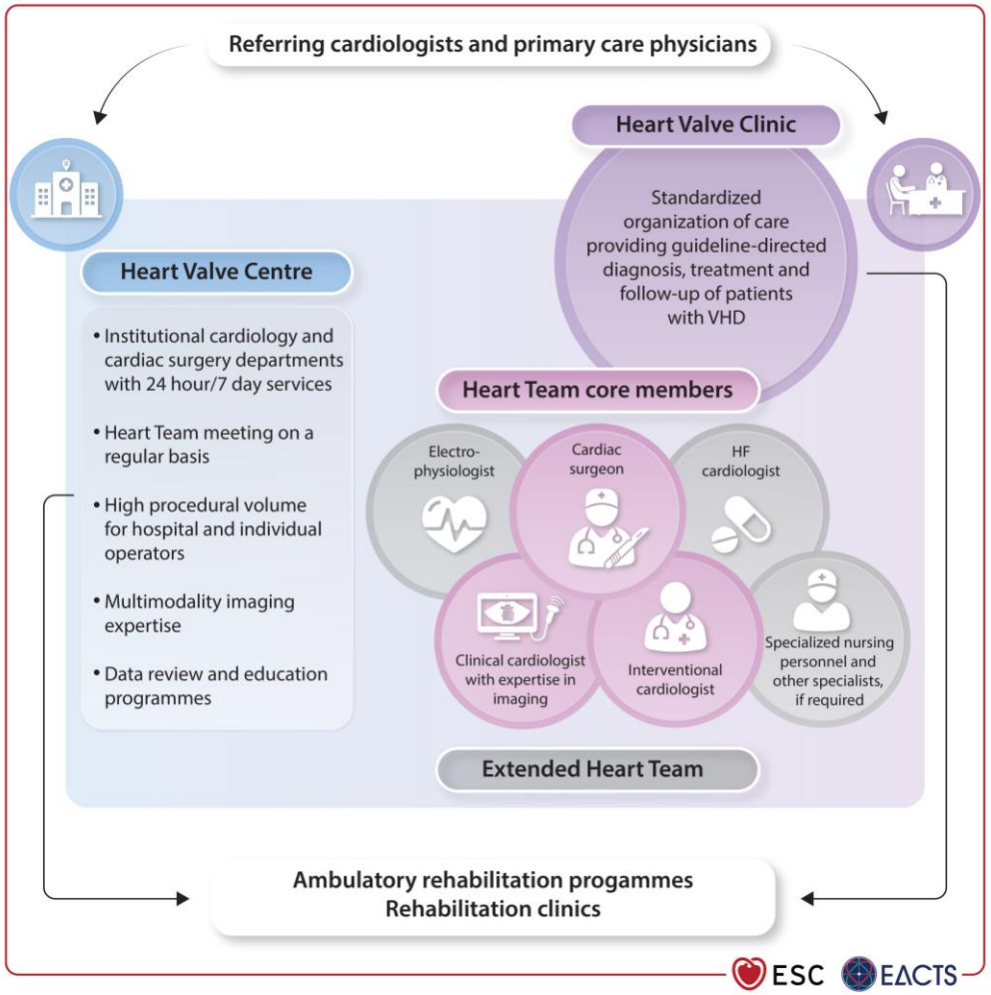




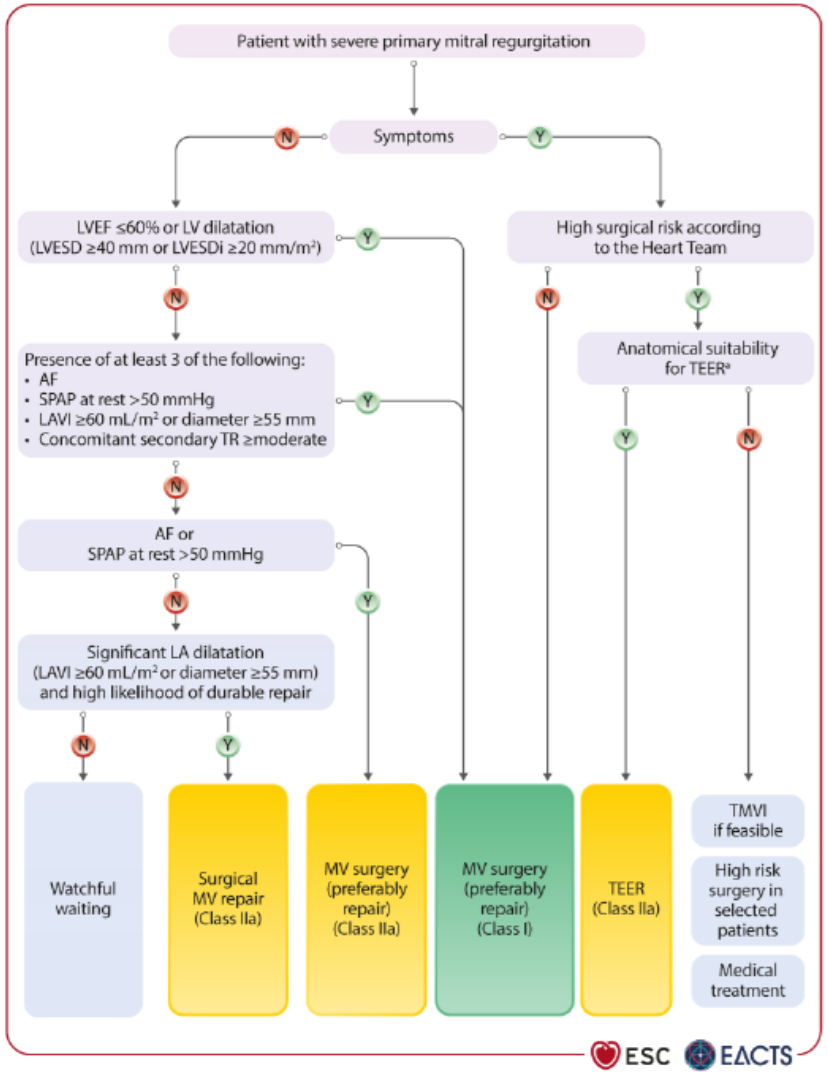


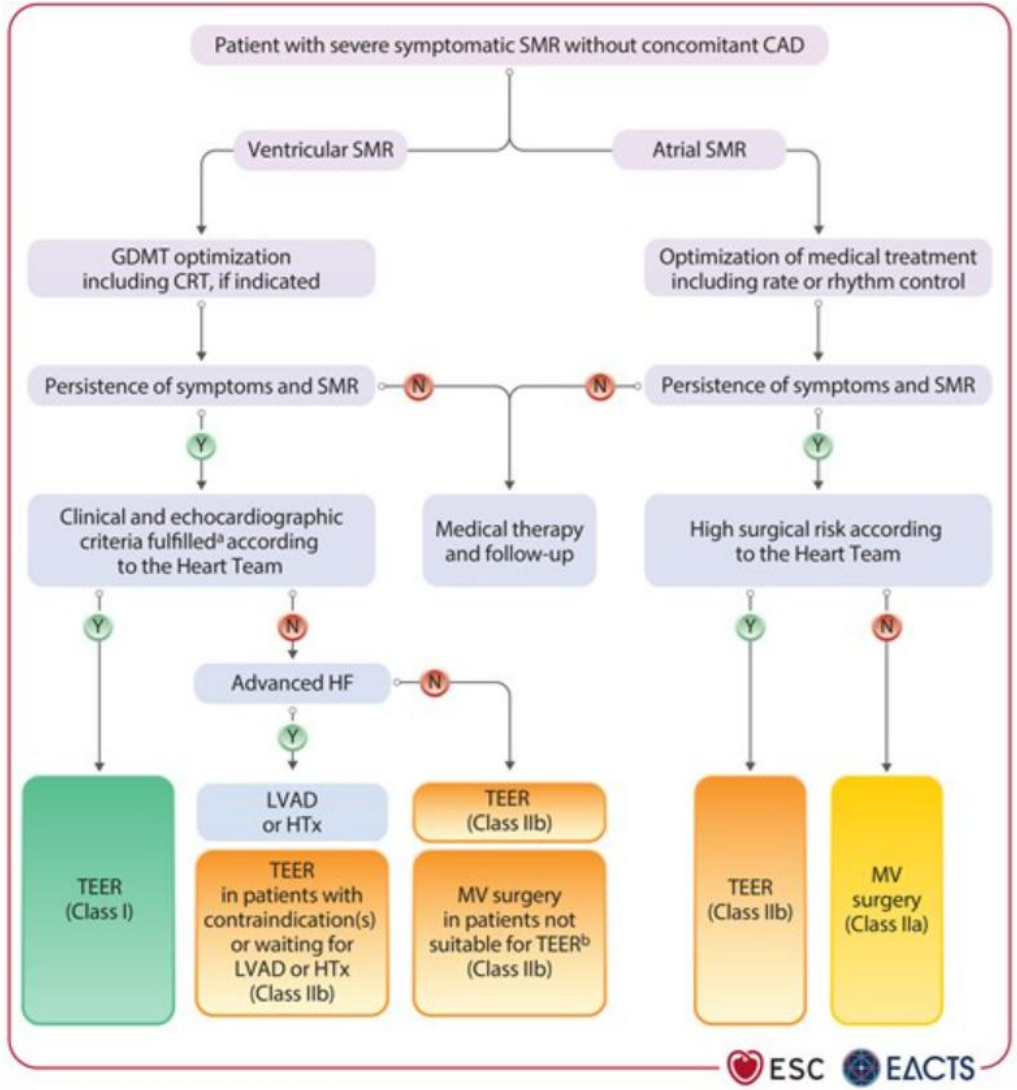
Převzato a upraveno dle Stephen H. Little, JACC 2021

Heart team


Referring cardiologists and primary care physicians
Heart Valve Clinic
Standardized organization of care providing guideline-directed diagnosis, treatment and follow-up of patients with VHD
Heart Valve Centre
• Institutional cardiology and cardiac surgery departments with 24 hour/7 day services
• Heart Team meeting on a regular basis
• High procedural volume for hospital and individual operators
• Multimodality imaging expertise
• Data review and education programmes
Heart Team core members
Electro-physiologist
Cardiac surgeon
HF cardiologist
Clinical cardiologist with expertise in imaging
Interventional cardiologist
Specialized nursing personnel and other specialists, if required
Extended Heart Team
Ambulatory rehabilitation progammes
Rehabilitation clinics
ESC
EACTS

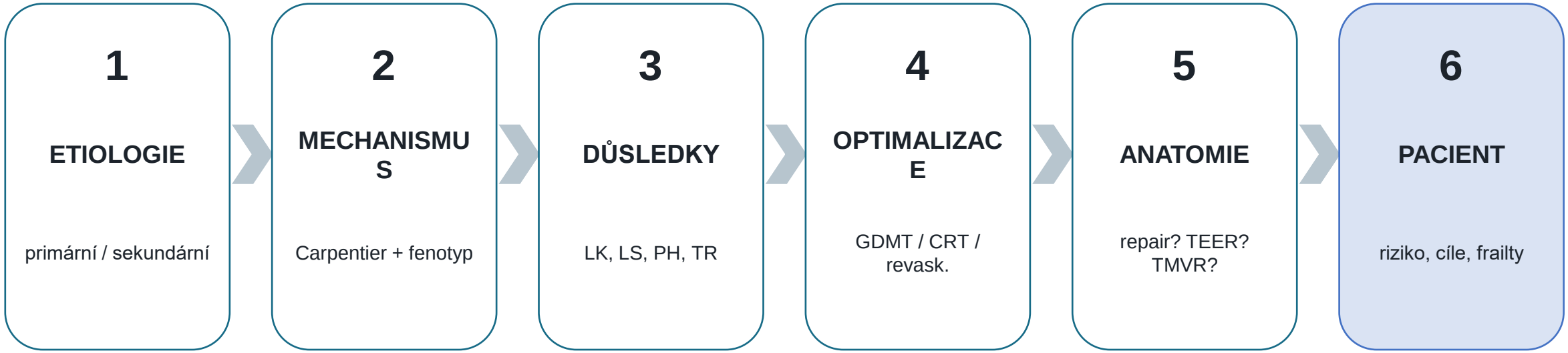
Mitrální regurgitace- současná doporučení





Převzato a upraveno dle Eur Heart J, ehaf194

Rozhodovací algoritmus 2026



Technologie je až pátá otázka — nikoli první.

A jak dál ?

Současná diagnostika a léčba je stále více multimodální, multidisciplinární a stále více individualizovaná

Budoucnost ?

Bude především o **precizní fenotypizaci pacienta**.

Budeme chtít ještě přesněji vědět:

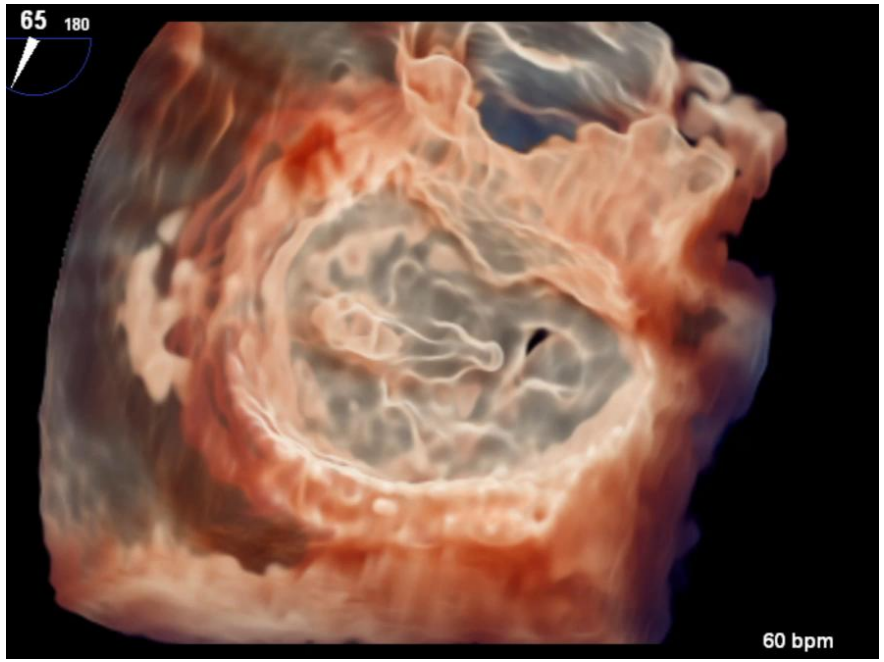
- kdo bude profitovat z časné operace,
- kdo bude profitovat z TEER,
- kdo potřebuje léčbu levé komory,
- kdo potřebuje řešit fibrilaci síní,
- kdo bude vhodný pro TMVR,

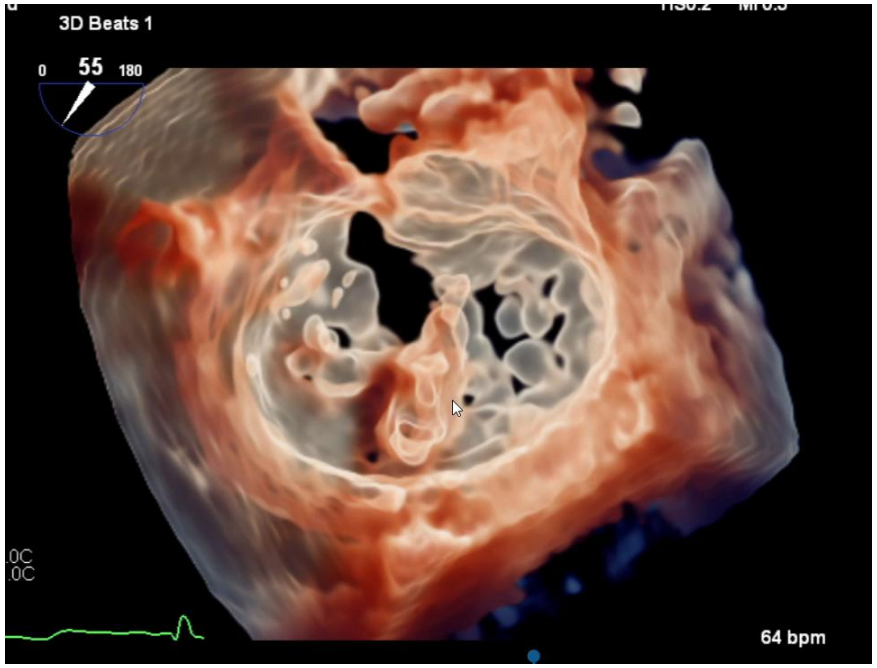
a kdo naopak žádnou intervenci nepotřebuje

od šelestu k obrazu

od obrazu k porozumění

od porozumění k správnému rozhodnutí





Děkuji za pozornost