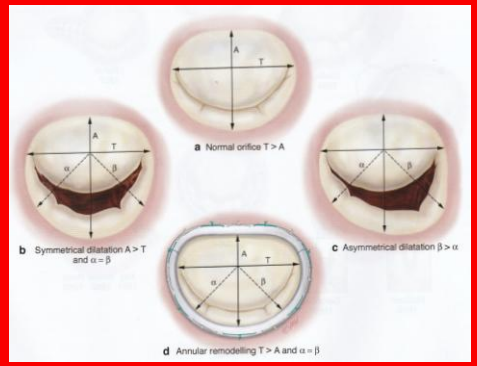
MITRÁLNÍ VADY – SOUČASNÉ MOŽNOSTI LÉČBY Z POHLEDU CHIRURGE

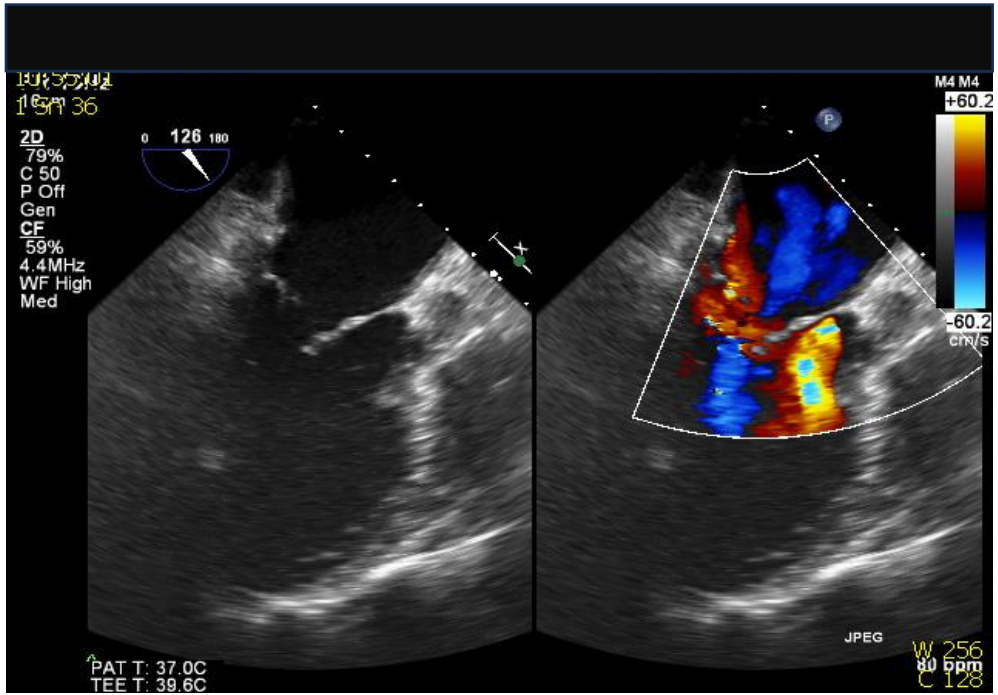
Štěpán ČERNÝ
Klinika kardiovaskulární chirurgie
FN Motol, Praha

FN M+H Fakultní nemocnice Motol a Homolka



Chirurgie mitrální chlopně

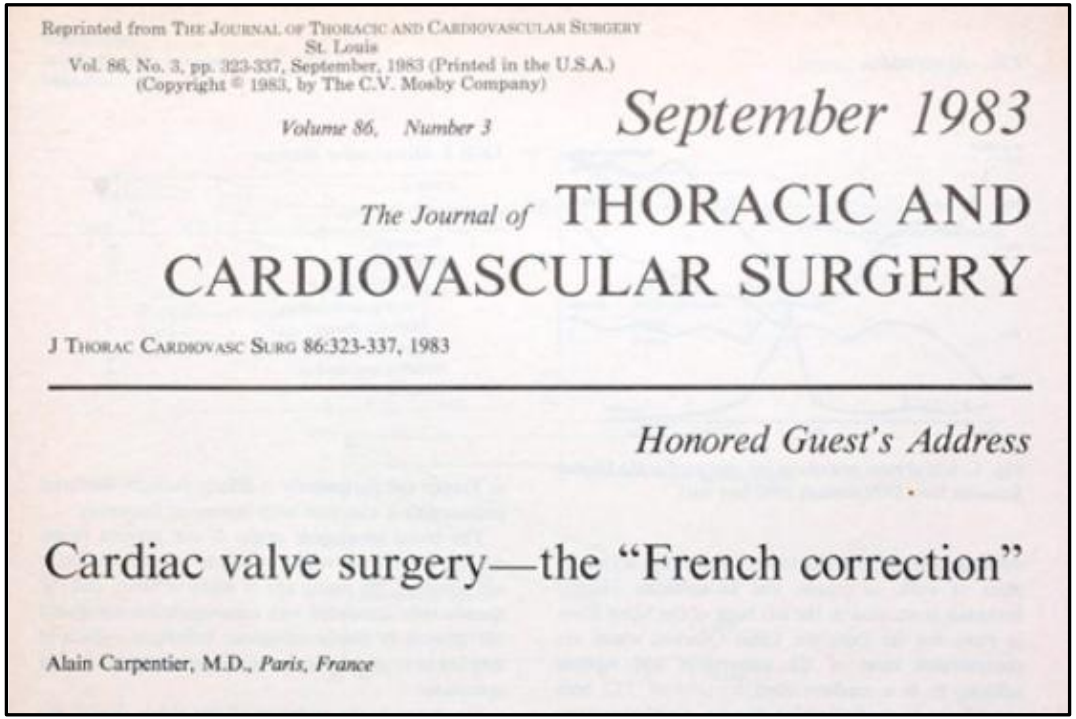
Primární MR - TEE



ERO ≥ 0,4 cm² **RV ≥ 60mL**

Chirurgie mitrální chlopně

Primární MR – Chirurgická plastika chlopně



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St. Louis
Vol. 86, No. 3, pp. 323-337, September, 1983 (Printed in the U.S.A.)

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

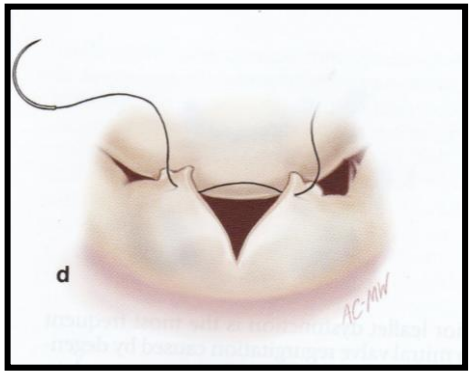
Cardiac valve surgery—the "French correction"

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

Carpentier A, J Thorac Cardiovasc Surg 1983;86:323-37

Chirurgie mitrální chlopně

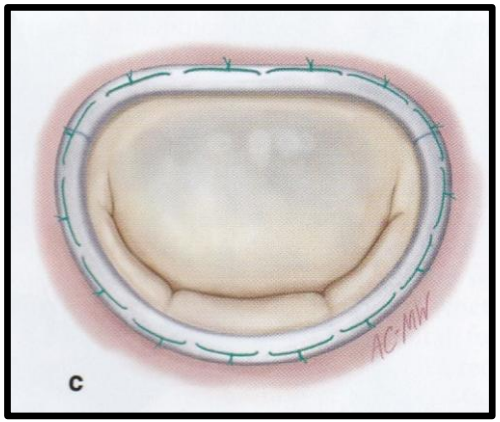
Primární MR – Chirurgická plastika chlopně

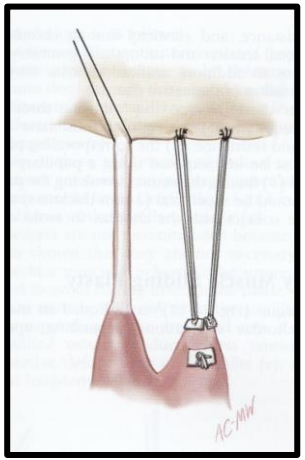


KOREKCE LÉZE !!!!

+

REMODELACE ANULU !!!!!!

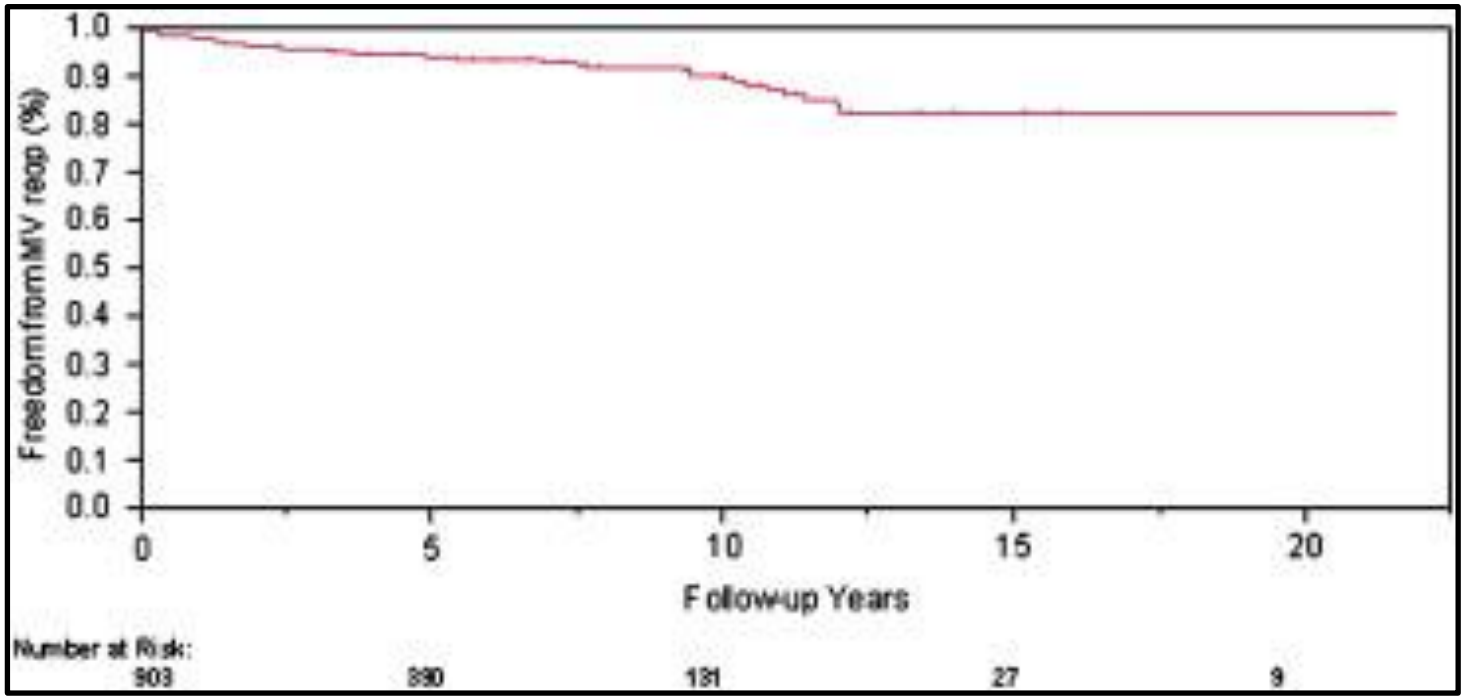




Carpentier A, Adams DH, Filsoufi F, Saunders Elsevier 2010

Chirurgie mitrální chlopně

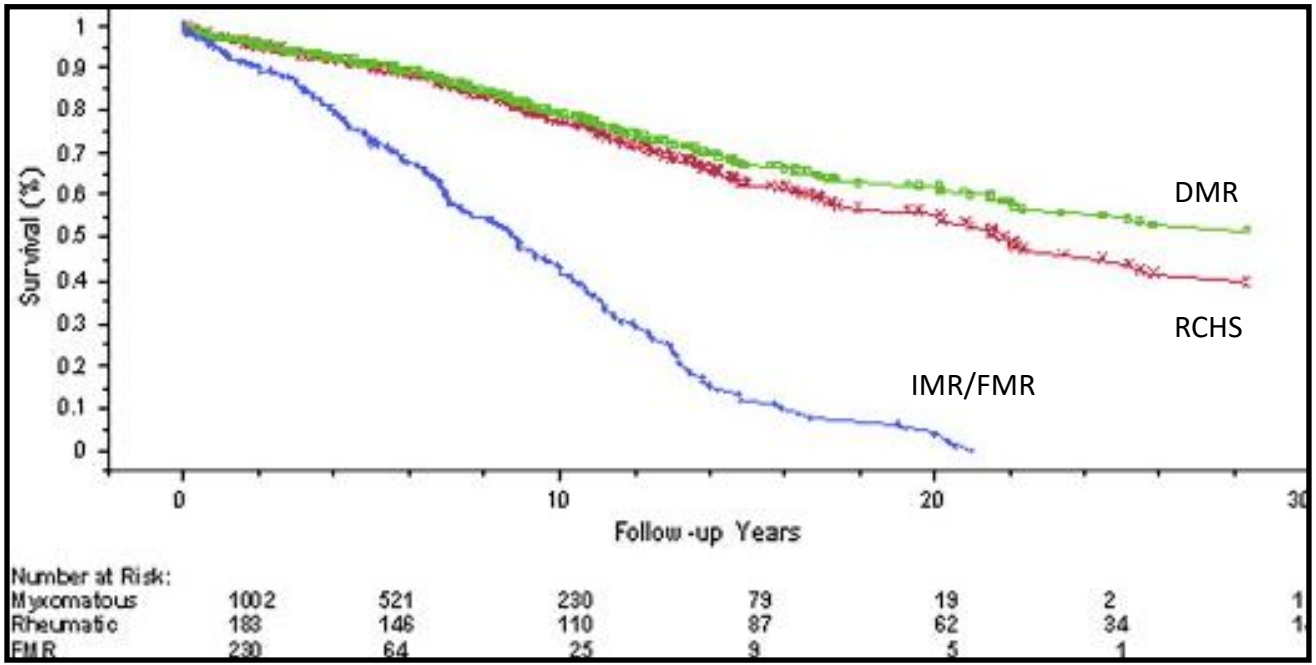
Primární MR – Přežívání bez reoperace – 80% po 20 letech



DiBardino DJ et al: J Thorac Cardiovasc Surg 2010;139:76-84

Chirurgie mitrální chlopně

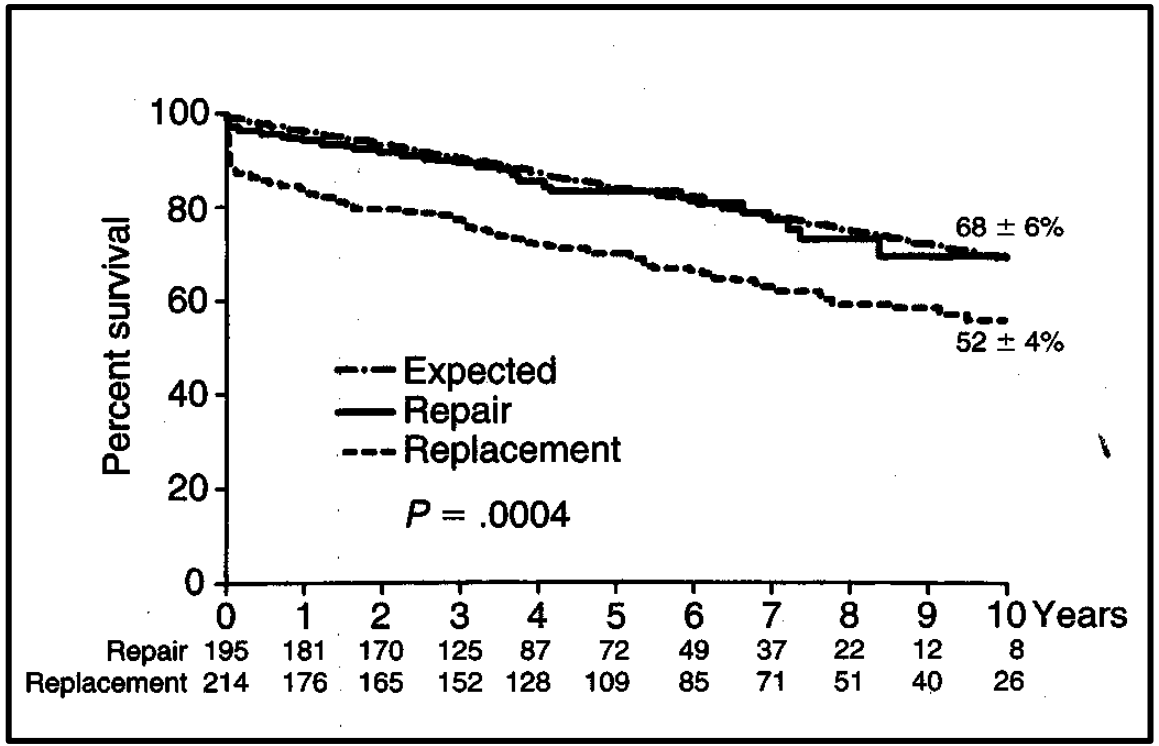
Primární MR – Přežívání bez reoperace – dle etiologie



DiBardino DJ et al: J Thorac Cardiovasc Surg 2010;139:76-84

Chirurgie mitrální chlopně

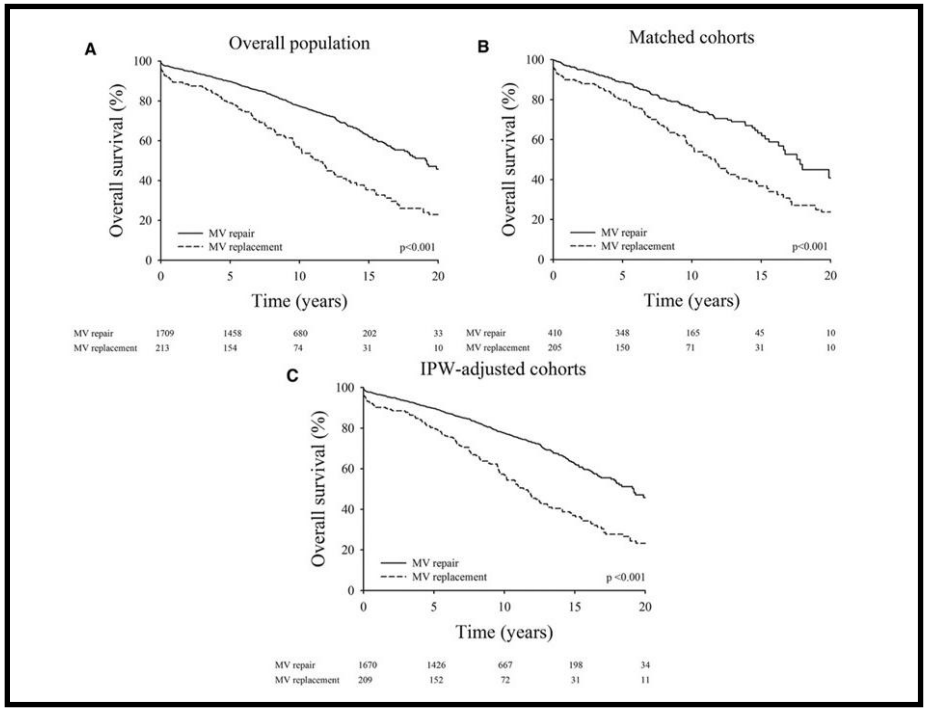
Primární MR – Rozdíly v přežívání mezi MVP a MVR



Enriquez-Sarano M et al: Circulation 1995;91:1022

Chirurgie mitrální chlopně

Primární MR – Rozdíly v přežívání mezi MVP a MVR – MIDA registry



- MIDA Registry
- 1980 – 2025
- Střední sledování 9,4 roku (4,4-18,1)
- 1709 MVP a 213 MVR
- Propensity score matching
- Propensit score matching +IPW (inversed probability of having MVP)

Lazam S et al: Circulation 2017;135:410-422

Chirurgie mitrální chlopně

Primární MR – Reparabilita MCH se ve specializovaných centrech blíží 100%

A near 100% repair rate for mitral valve prolapse is achievable in a reference center: Implications for future guidelines

Javier G. Castillo, MD, Anelechi C. Anyanwu, MD, Valentin Fuster, MD, PhD, and David H. Adams, MD

Background: Although mitral valve repair is the recommended treatment for severe mitral regurgitation of degenerative etiology, valve replacement remains common, particularly for complex lesions or anterior leaflet involvement. We sought to characterize the feasibility and outcomes of an "all comers" repair strategy applied systematically in all cases of degenerative mitral valve disease, regardless of age, complexity, or leaflet involvement.

Methods: From January 2002 to December 2010, 744 consecutive patients (mean age, 58 ± 13 years [range, 12-90]; mean LVEF, 55% ± 9%) with degenerative mitral valve regurgitation and prolapse (anterior leaflet: n = 42, 6%; posterior leaflet: n = 556, 75%; bileaflet: n = 146, 19%) underwent mitral valve surgery. Annular, leaflet or chordal calcification was present in 27% of cases.

Results: All patients underwent mitral valve repair and received a concomitant annuloplasty with a median ring size of 32 mm (interquartile range, 30-36). There was 1 early valve replacement (99.9% repair rate) due to atrioventricular groove bleeding and 5 late re-repairs (0.7%) due to disease progression or infective endocarditis. In-hospital mortality and major stroke rates were 0.8% and 0.5%, respectively. Survival rates at 1 and 5 years were 99.2% ± 0.3% and 97.4% ± 0.8%, respectively. Seven-year freedom from reoperation was 97.1% ± 0.6%. The estimate of patients with <3+ mitral regurgitation at 4 and 7 years was 98% and 96%, respectively, and 95% and 91%, respectively, for <2+ mitral regurgitation.

Conclusions: A systematic strategy of mitral valve repair that uses a variety of techniques allows repair of all degenerative valves in a reference center, with good short-term outcomes and mid-term durability. Further study is required to document the long-term efficacy of an "all comers" mitral valve repair strategy in degenerative subgroups with very complex valve morphology. (J Thorac Cardiovasc Surg 2012;144:308-12)

99,9 %

Castilo JG et al: *J Thorac Cardiovasc Surg 2012*;144:318-12

Chirurgie mitrální chlopně

Primární MR – Velmi nízká mortalita u izolované chirurgické MVP

Increasing Disadvantage of "Watchful Waiting" for Repairing Degenerative Mitral Valve Disease

Farhang Yazdchi, MD, MS, Colleen G. Koch, MD, MS, Tomislav Mihaljevic, MD, Rory Hachamovitch, MD, Ashley M. Lowry, MS, Jiayan He, ScD, A. Marc Gillinov, MD, Eugene H. Blackstone, MD, and Joseph F. Sabik, III, MD

Departments of Thoracic and Cardiovascular Surgery, Cardiothoracic Anesthesia, and Cardiovascular Medicine, Heart and Vascular Institute; and Department of Quantitative Health Sciences, Research Institute, Cleveland Clinic, Cleveland, Ohio

Background. Successful durable repair of severe degenerative mitral regurgitation with low operative mortality encourages intervention in asymptomatic patients rather than "watchful waiting." Our objectives were to assess trends in patient characteristics, timing of intervention, and evolving surgical techniques at a high-volume center, and determine effects of these changes on outcomes after mitral valve (MV) repair over a 25-year period.

Methods. From January 1, 1985, to January 1, 2011, 5,902 patients underwent isolated repair (with or without tricuspid repair for functional regurgitation) for degenerative MV disease at Cleveland Clinic. For illustration, the experience is presented in 3 eras: 1985 to 1997 (era 1, n = 1,184), 1997 to 2005 (era 2, n = 2,400), and 2005 to 2011 (era 3, n = 2,318).

Results. In era 3, more patients were asymptomatic on presentation (44% in New York Heart Association [NYHA] class I vs 25% in era 1), with less heart failure (11% vs 29%) and atrial fibrillation (9.9% vs 23%). Full sternotomy decreased from era 1 (n = 1,100/93%) to era 2 (n = 602/25%) (era 3, n = 717/31%), and robotic surgery emerged (n = 577/25%) in era 3. Median length of stay shortened (era 1 = 7 days, era 2 = 5.9 days, era 3 = 5.2 days; P < 0.0001), and in-hospital mortality remained low (era 1 = 5/0.42%, era 2 = 5/0.21%, era 3 = 1/0.043%); 0.73% overall required reoperation on the repaired valve before discharge, and 97% had 0 to 1+ regurgitation at discharge.

Conclusions. Treatment trends over 25 years reveal that rather than watchful waiting, a more aggressive approach to degenerative MV disease, with earlier intervention for severe regurgitation in asymptomatic patients and less invasive operative techniques, is successful, safe, and effective.

(Ann Thorac Surg 2015;■:■–■)

0,18%

Yazdchi F et al: *Ann Thorac Surg 2015*;99(6):1992-2000

Chirurgie mitrální chlopně

Primární MR – Přežívání po MVP dle NYHA

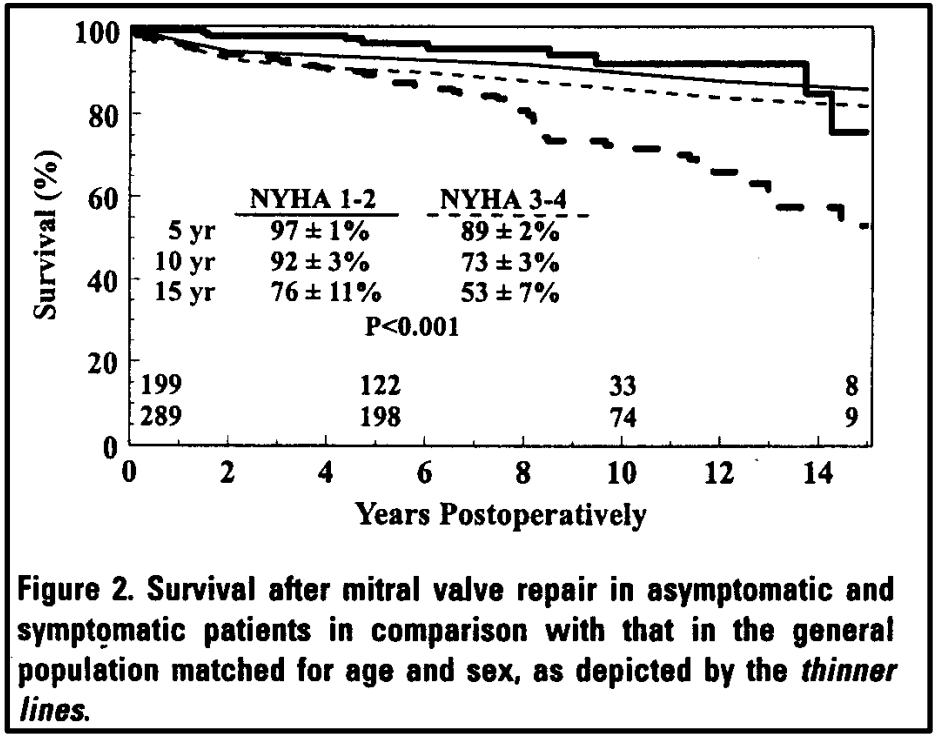
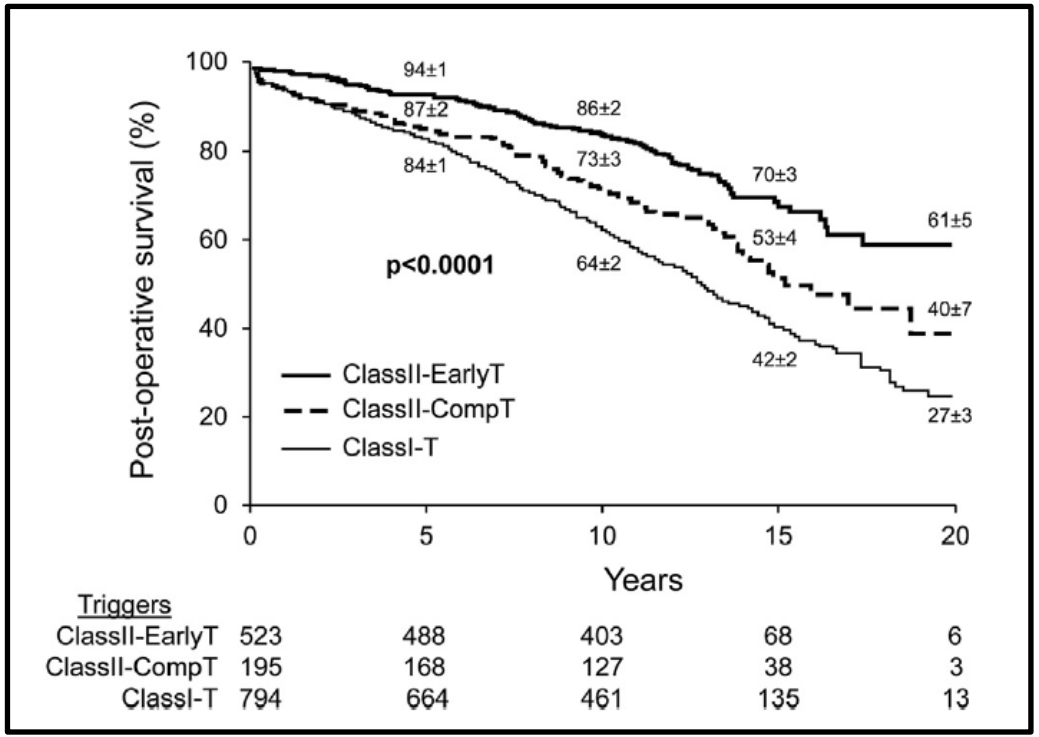


Figure 2. Survival after mitral valve repair in asymptomatic and symptomatic patients in comparison with that in the general population matched for age and sex, as depicted by the *thinner lines*.

David TE et al: J Thorac Cardiovasc Surg 2003;125:1143-52

Chirurgie mitrální chlopně

Primární MR – Class I trigery vs. Class II trigery



Enriquez-Sarano M et al: *J Thorac Cardiovasc Surg 2015; 1500(1):50-8*

Chirurgie mitrální chlopně

Primární MR – Přežívání po MVP dle léčebné strategie

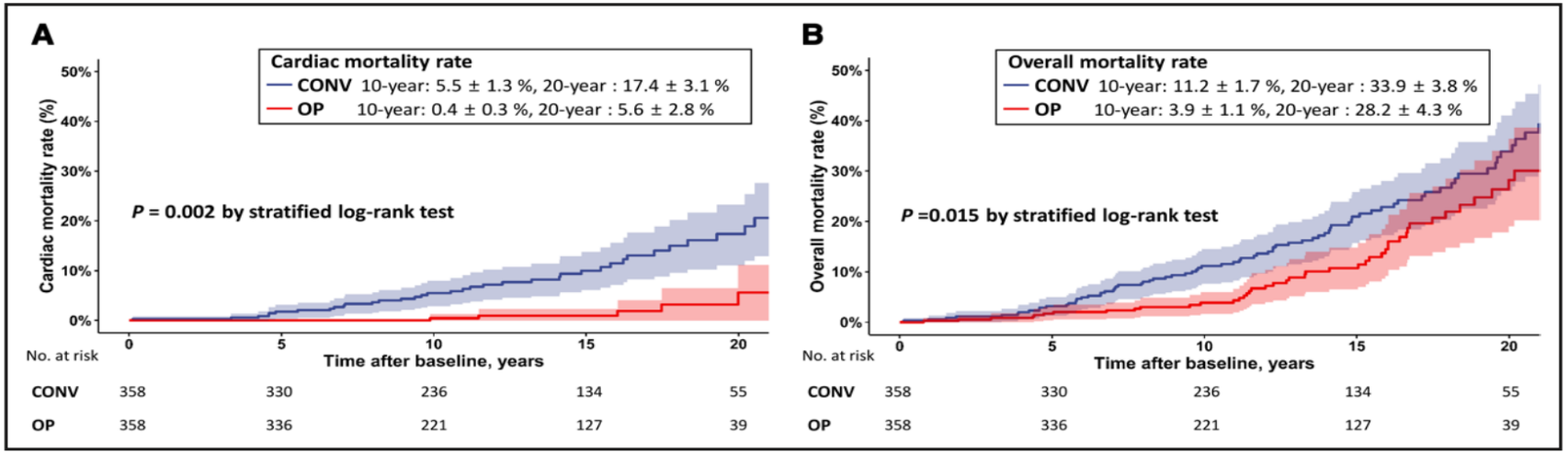


Figure 2. Comparison of conventional treatment and early surgery in terms of actuarially determined cardiac and overall mortality rates in the propensity-matched cohort.

1063 pacientů, 12 let sledování, 358 PSM párů, 0,0% operační mortalita, 97% repair rate

Park SJ et al: Circulation 2025;152(17):1209-17

Chirurgie mitrální chlopně

Primární MR - ESC/EACTS Guidelines 2025

Recommendations	Class[a]	Level[b]
MV repair is the recommended surgical technique to treat patients with severe PMR when the result is expected to be durable.[26,532,533,559,560]	I	B
MV surgery is recommended in symptomatic patients with severe PMR considered operable by the Heart Team.[26,532,533,561]	I	B
MV surgery is recommended in asymptomatic patients with severe PMR and LV dysfunction (LVESD ≥40 mm or LVESDi ≥20 mm/m^2 or LVEF ≤60%).[522,544,545]	I	B
Surgical MV repair is recommended in low-risk asymptomatic patients with severe PMR without LV dysfunction (LVESD <40 mm, LVESDi <20 mm/m^2, and LVEF >60%) when a durable result is likely, if at least three of the following criteria are fulfilled:[517,547,562–564] • AF • SPAP at rest >50 mmHg • LA dilatation (LAVI ≥60 mL/m^2 or LA diameter ≥55 mm) • Concomitant secondary TR ≥ moderate.	I	B

Praz F et al: *EJCTS 2025*; 67(8) ezaf276

Chirurgie mitrální chlopně

Primární MR - ESC/EACTS Guidelines 2025

MV surgery should be considered in asymptomatic patients with severe PMR without LV dysfunction (LVESD <40 mm, LVESDi <20 mm/m^2, and LVEF >60%) in the presence of PH (SPAP at rest >50 mmHg), or AF secondary to MR.[517,518,562,565]	IIa	B
Surgical MV repair should be considered in low-risk asymptomatic patients with severe PMR without LV dysfunction (LVESD <40 mm, LVESDi <20 mm/m^2, and LVEF >60%) in the presence of significant LA dilatation (LAVI ≥60 mL/m^2 or LA diameter ≥55 mm), when performed in a Heart Valve Centre and a durable repair is likely.[517,565]	IIa	B
TEER should be considered in symptomatic patients with severe PMR who are anatomically suitable and at high surgical risk according to the Heart Team.[539,540,566]	IIa	B
Minimally invasive MV surgery may be considered at experienced centres to reduce the length of stay and accelerate recovery.[557,567]	IIb	B

Praz F et al: *EJCTS 2025*; 67(8) ezaf276

Chirurgie mitrální chlopně

Primární MR – Barlow´s disease – „bileaflet prolapse“

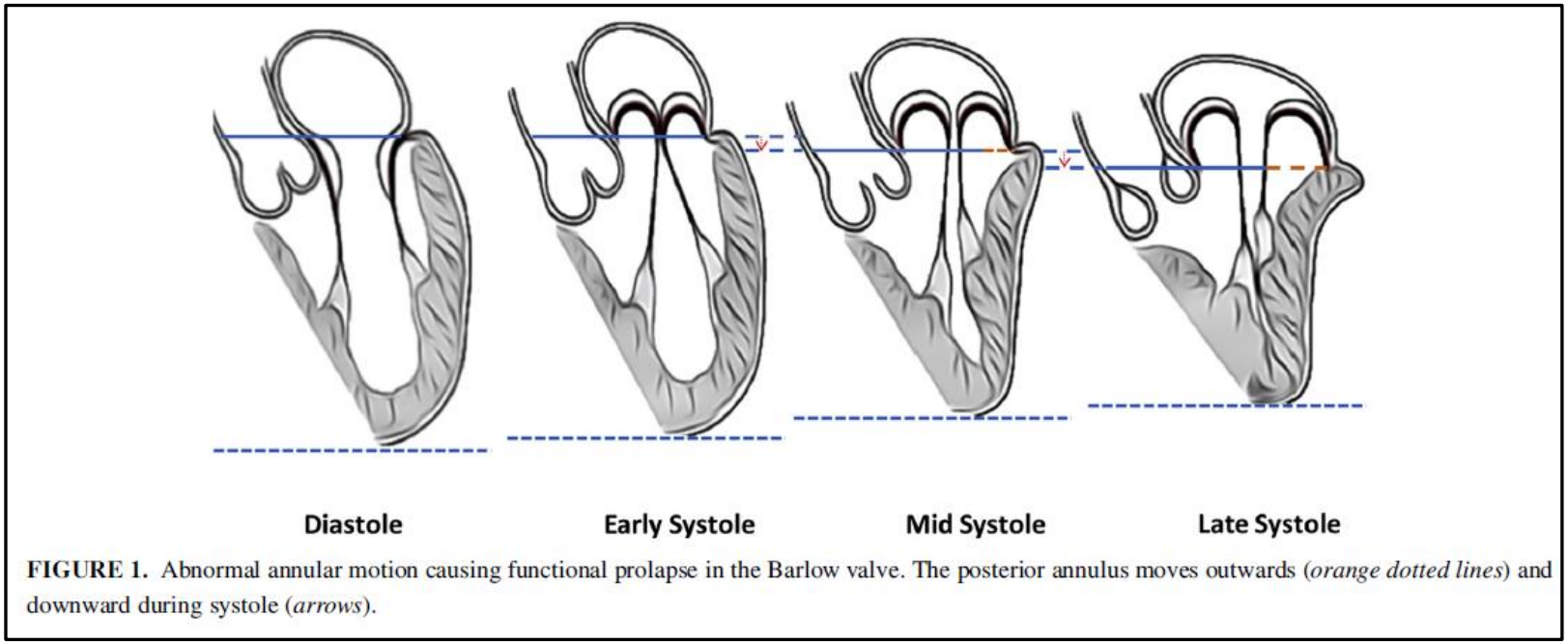


FIGURE 1. Abnormal annular motion causing functional prolapse in the Barlow valve. The posterior annulus moves outwards (*orange dotted lines*) and downward during systole (*arrows*).

Barlow CF: JCTVS Techniques 2021;10:58-63

Chirurgie mitrální chlopně

Primární MR – Barlow´s disease – „bileaflet prolapse“

Key question

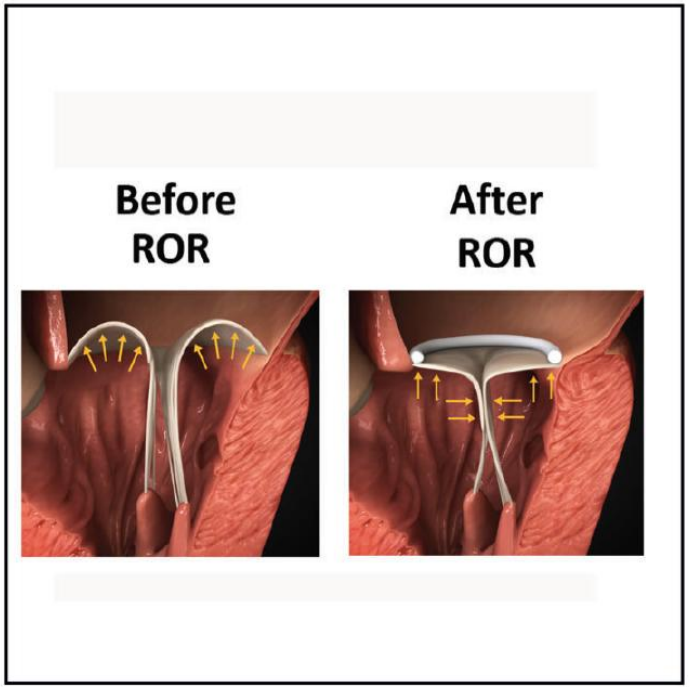
Can multisegment bileaflet mitral valve prolapse be effectively repaired by annuloplasty alone?

Key finding(s)

At follow-up, there was 1 (1%) reoperation; freedom from recurrent moderate or more MR was 95%.

Take-home message

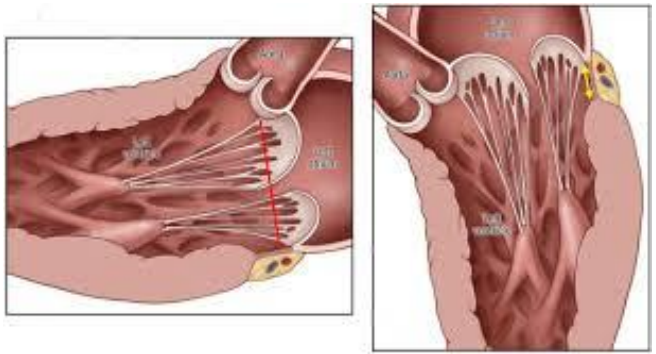
In well-defined patients with multisegment prolapse, annuloplasty alone provides excellent functional and long-term results.



Raanani E: EJCTS 2021;00:1-9

Chirurgie mitrální chlopně

Primární MR – Barlow´s disease – „bileaflet prolapse“



Mitral Annular Disjunction: A Roadmap for the Surgeon

Nikolaos Bonaros[1]; Can Gollmann-Tepeköylü[1]; Meindert Palmen[2]; Nina Ajmone[3]; Victoria Delgado[4]; Madalina Garbi[5]; Agnes Mayr[6]; Leo Pölzl[1]; Mateo Marin-Cuartas[7]; Guido Ascione[8]; Nicolo Azzola Guicciardi[8]; Felix Troger[6]; Daniel Pereda[9]; Robert Klautz[2]; Michele De Bonis[8]; Michael Andrew Borger[7]; Patrick Perier[10]

Objectives: Mitral annular disjunction (MAD) is a structural abnormality of the mitral annulus fibrosus, associated with myxomatous leaflet degeneration, mitral valve prolapse (MVP), and ventricular arrhythmias. The combination of annular dilatation and abnormal annular motion increases mechanical stress on the mitral leaflets, triggering the degenerative process.

Methods: This review summarizes the major pathophysiologic, diagnostic and therapeutic measures for the treatment of patients with MAD and an indication for mitral surgery.

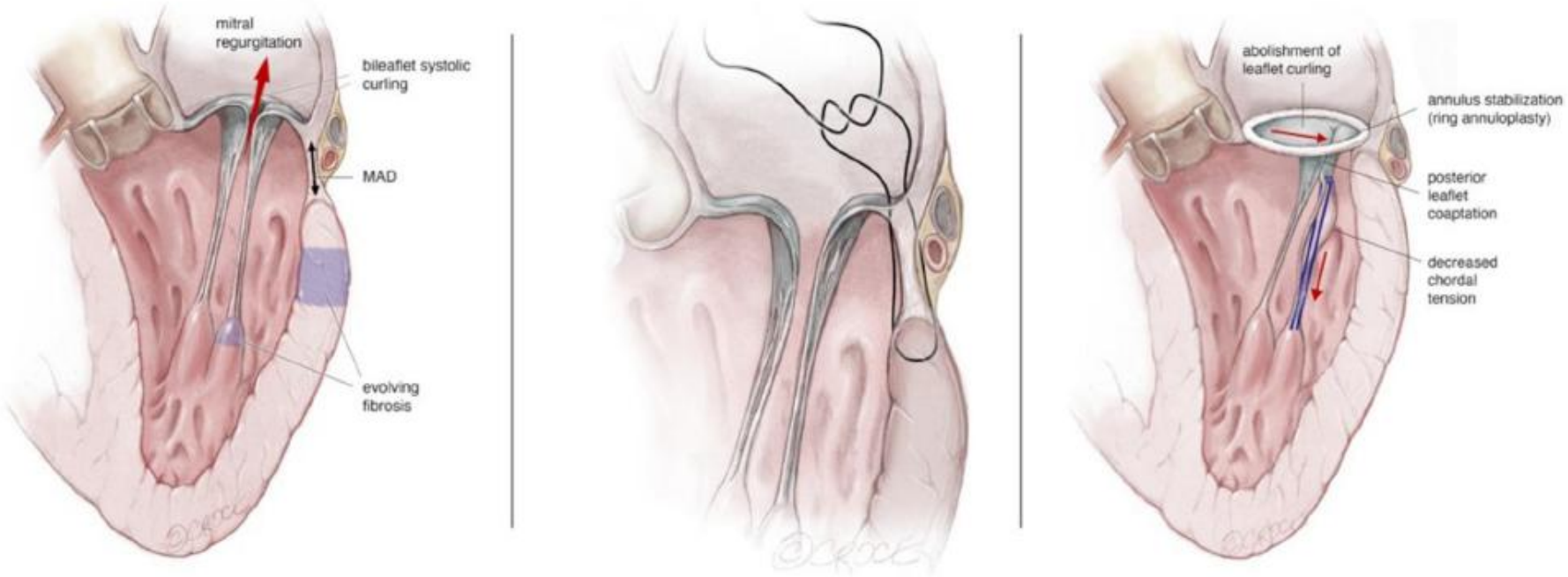
Results: The diagnosis is primarily based on non-invasive imaging techniques. Echocardiography is the first choice due to its ability to assess real-time mitral valve function. Cardiac computed tomography and magnetic resonance imaging provide more detailed information on the extent of MAD and the presence of calcifications. Indications for surgical mitral valve treatment are based on current recommendations. In cases with MAD and moderate mitral regurgitation, early intervention may be advocated in the presence of arrhythmogenic MVP. Long-term outcomes after treatment are assessed through multimodal imaging and electrocardiogram monitoring. A ring annuloplasty is an important cornerstone of treatment. Stabilization of the mitral annulus abolishes functional prolapse and increases the antiarrhythmic effect of mitral surgery. However, postoperative arrhythmic burden may persist in some cases, requiring continuous monitoring and sometimes an additional device therapy.

Conclusions: MAD represents a complex anatomical and functional entity associated with diagnostic challenges and rhythm abnormalities. Although the current indications for surgical treatment follow the recommendations for treatment of primary mitral regurgitation, early treatment may be important especially in patients with arrhythmias.

Bonaros et al: EJCTS 2026;68(1):ezaf461

Chirurgie mitrální chlopně

Primární MR – Barlow´s disease – „bileaflet prolapse“



Bonnaros et al: EJCTS 2026;68(1):ezaf461

Chirurgie mitrální chlopně

Mini-invazivní video-asistovaná plastika MCH

Chirurgie mitrální chlopně

Mini-invazivní video-asistovaná plastika MCH – Dlouhodobé výsledky

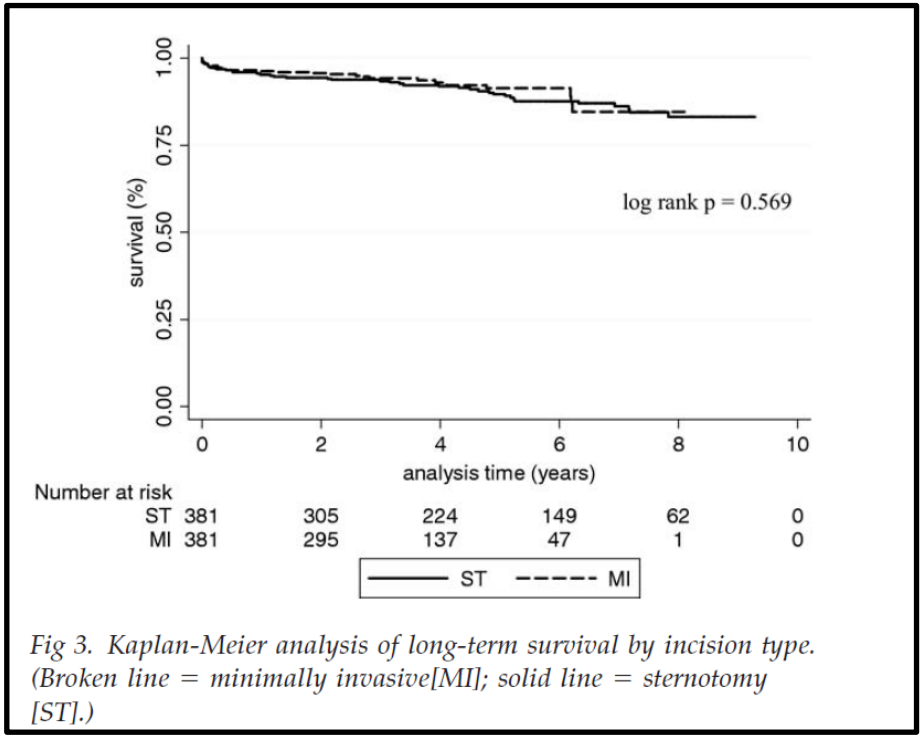
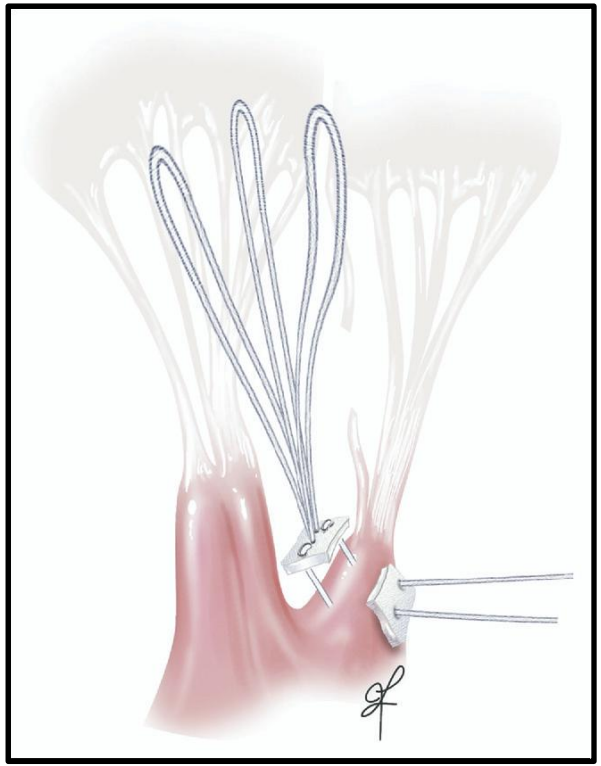


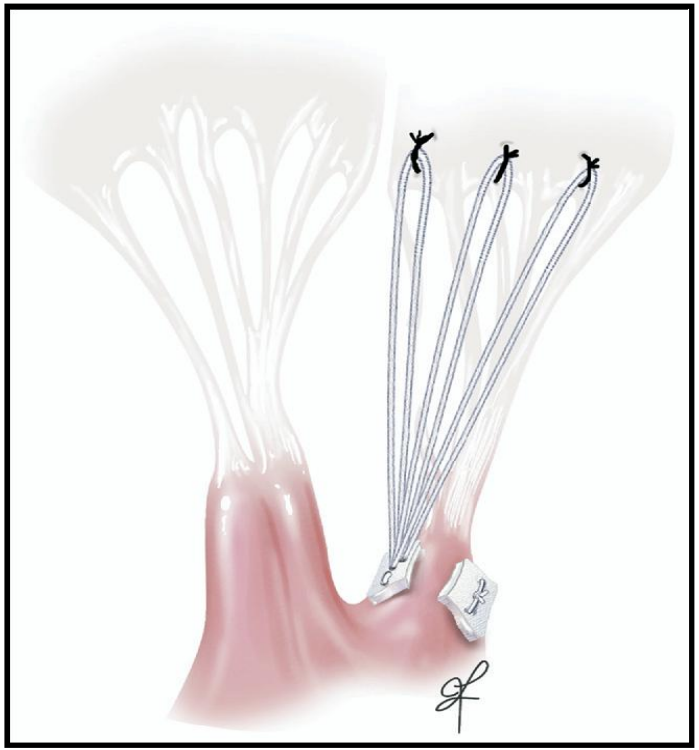
Fig 3. Kaplan-Meier analysis of long-term survival by incision type. (Broken line = minimally invasive[MI]; solid line = sternotomy [ST].)

Irbarne A et al: *Ann Thorac Surg 2010;90*:1471-8

Chirurgie mitrální chlopně

Mini-invazivní video-asistovaná plastika MCH – Chirurgická technika

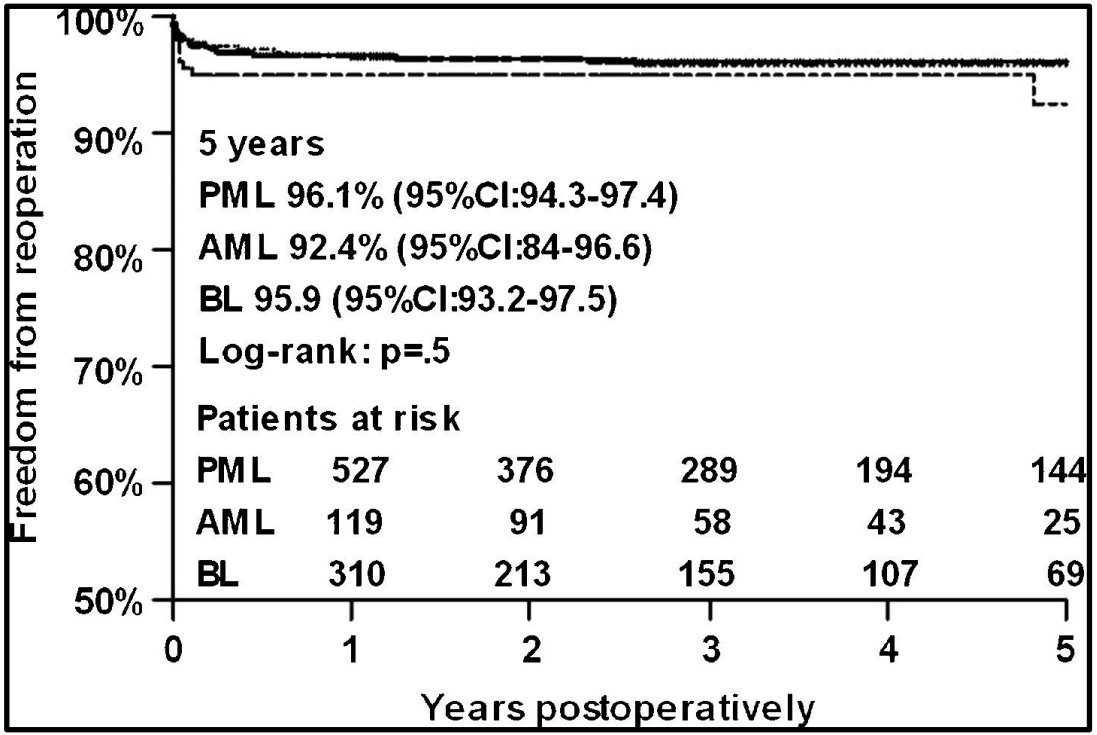




Seeburger J et al: *Semin Thorac Cardiovasc Surg 2007;19*:111-115

Chirurgie mitrální chlopně

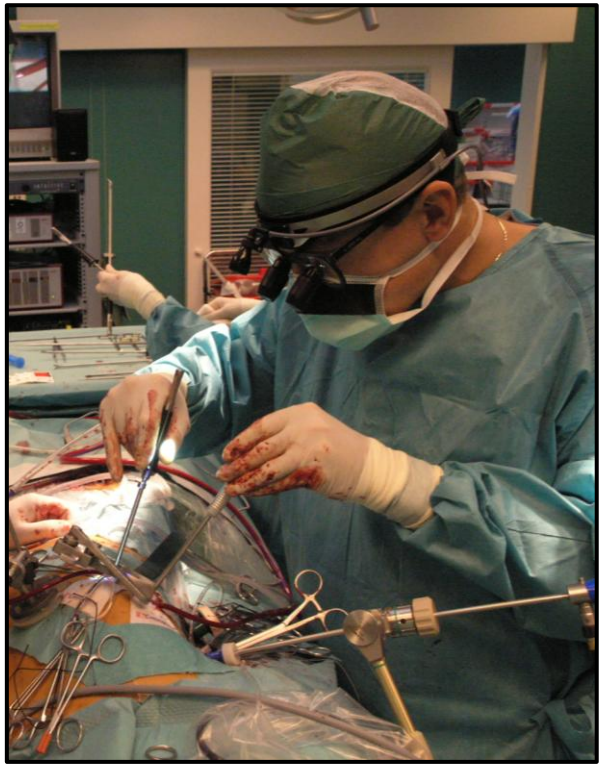
Mini-invazivní video-asistovaná plastika MCH – Chirurgická technika



Seeburger J et al: *Semin Thorac Cardiovasc Surg 2007;19*:111-115

Chirurgie mitrální chlopně

Mini-invazivní video-asistovaná plastika MCH

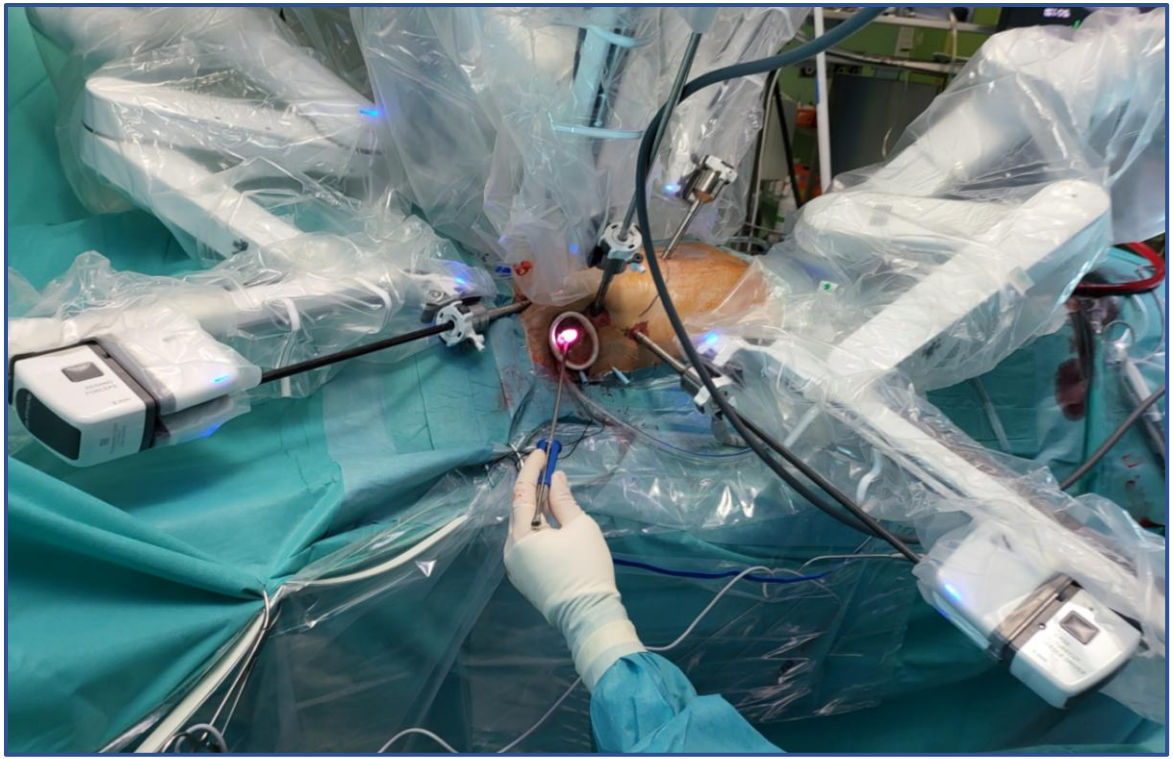


„MICS transfers pain from the patient to the surgeon.“

H. Vanermen

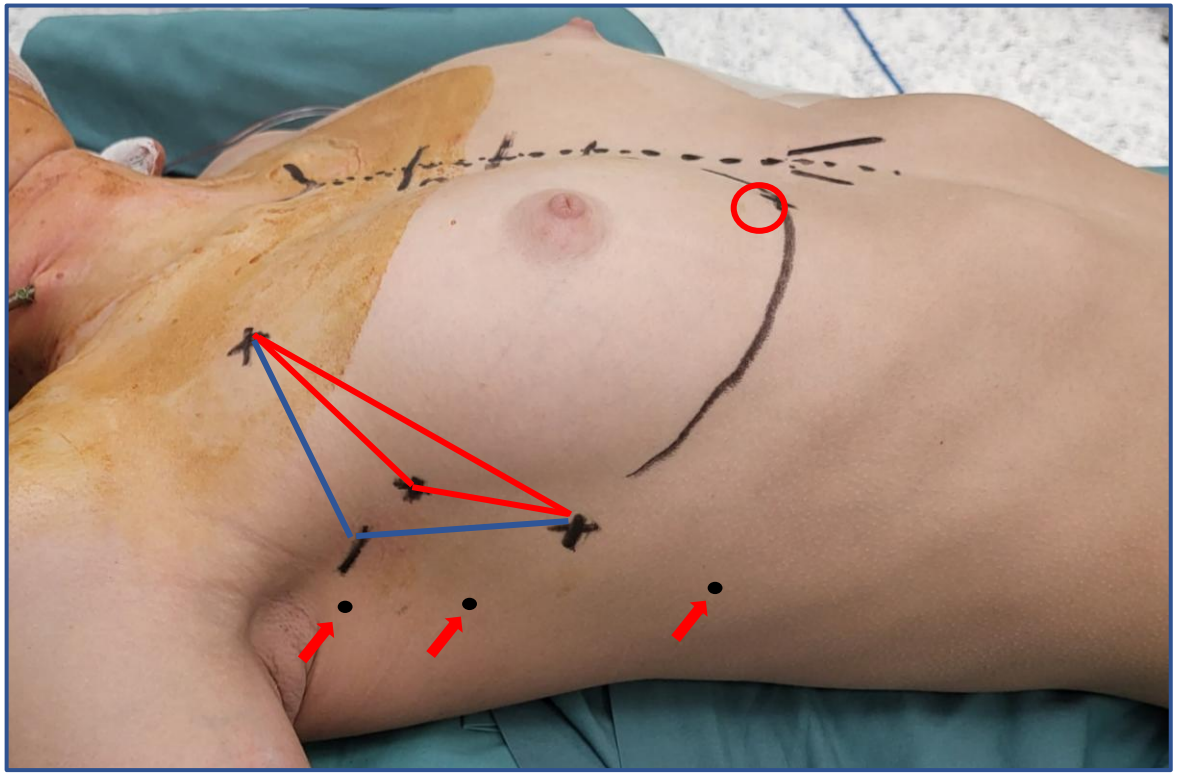
Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně



Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně

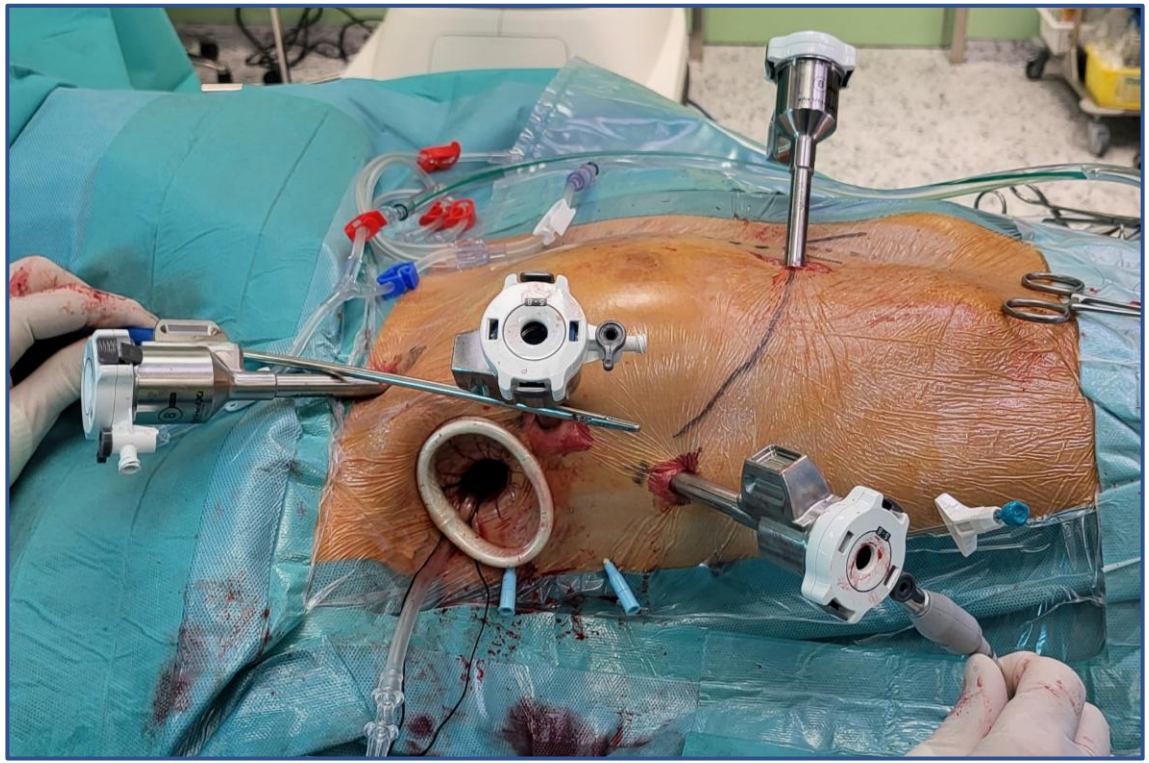


ROZMÍSTĚNÍ PORTŮ

- Čtyři 8mm trokary
- 2, 3 a 5 mezižebří pro robotické nástroje a kameru
- 4 (5-6) mezižebří pro dynamický LS rozvěrač
- 3 mezižebří pro asistentský port – 25 mm (1“)
- Perikardiální a brániční trakční stehy

Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně



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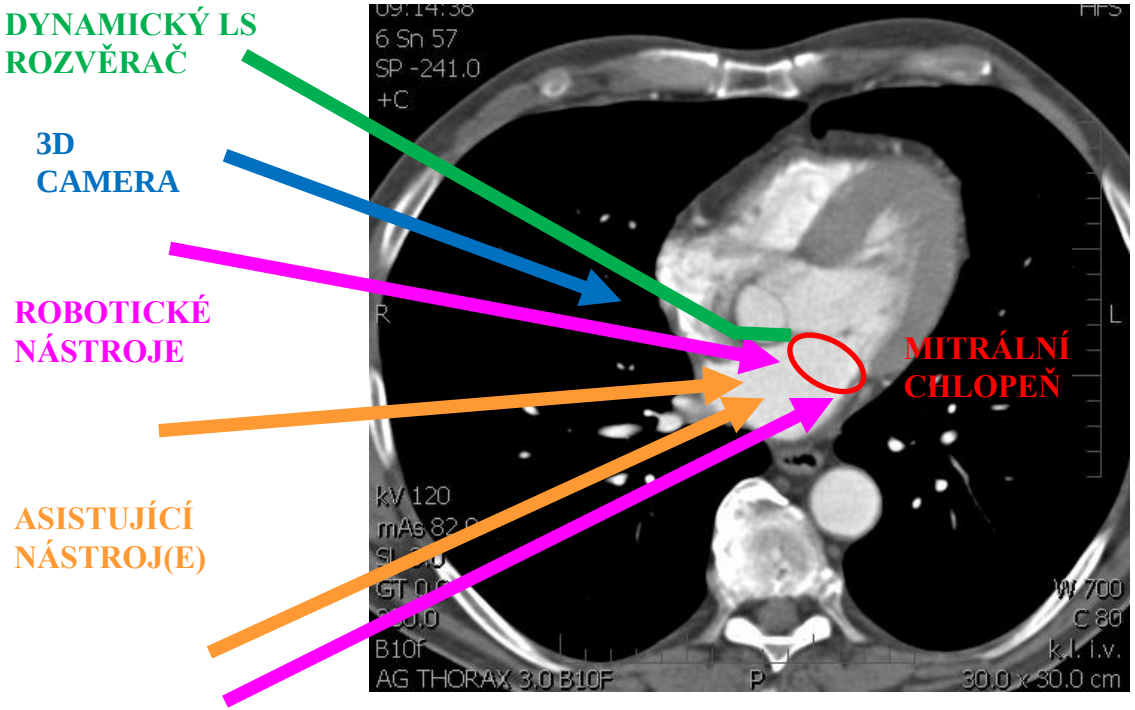
Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně

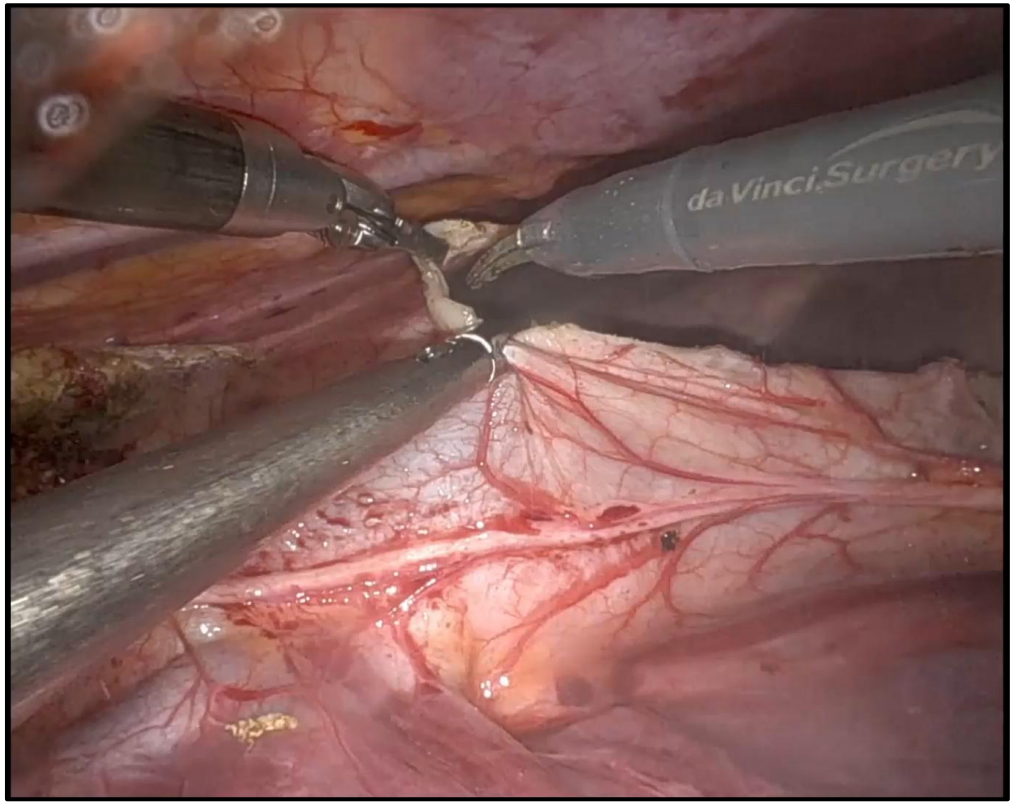


OPERAČNÍ POLE

- 3D Camera
- Dynamický LS rozvěrač
- Dvě robotická ramena – dva instrumenty
- 1 – 2 asistující nástroje

Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně

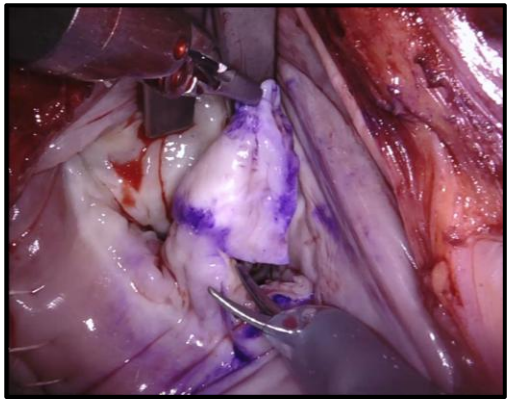


PLNĚ ENDOSKOPICKÝ VÝKON

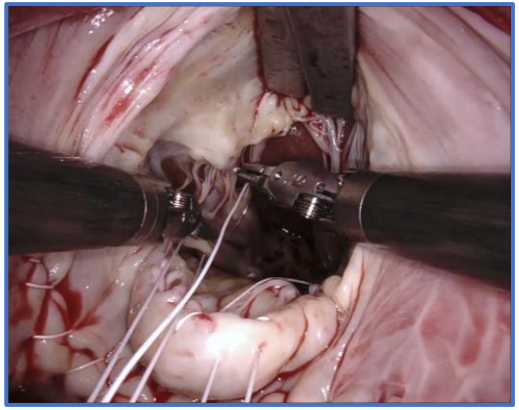
- Excelentní 3D vizualizace a přístup ke všem segmentům hrudní dutiny
- Bez limitace pohybu instrumentů (žádný „fulcrum efect“) – 7 stupňů volnosti
- Možnost pracovat uvnitř hrudníku a přímo na chlopni více než dvěma nástroji
- Pokročilá kooperace mezi chirurgem a asistentem
- Dynamický LS rozvěrač – excelentí přístup k mitrální chlopni

Chirurgie mitrální chlopně

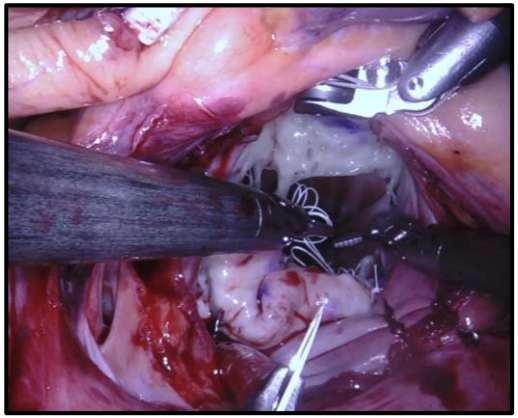
Techniky plastiky mitrální chlopně



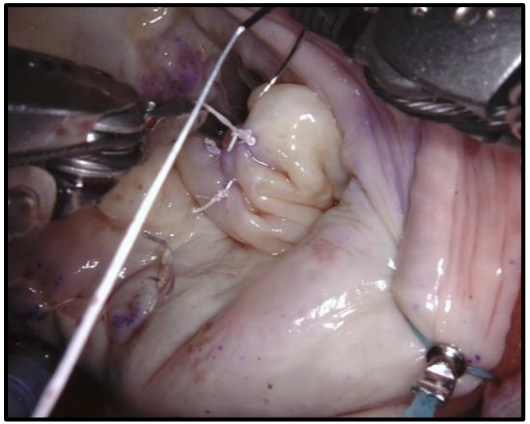
Triangulární resekce



Arteficialní Gore-Tex chordy“David“



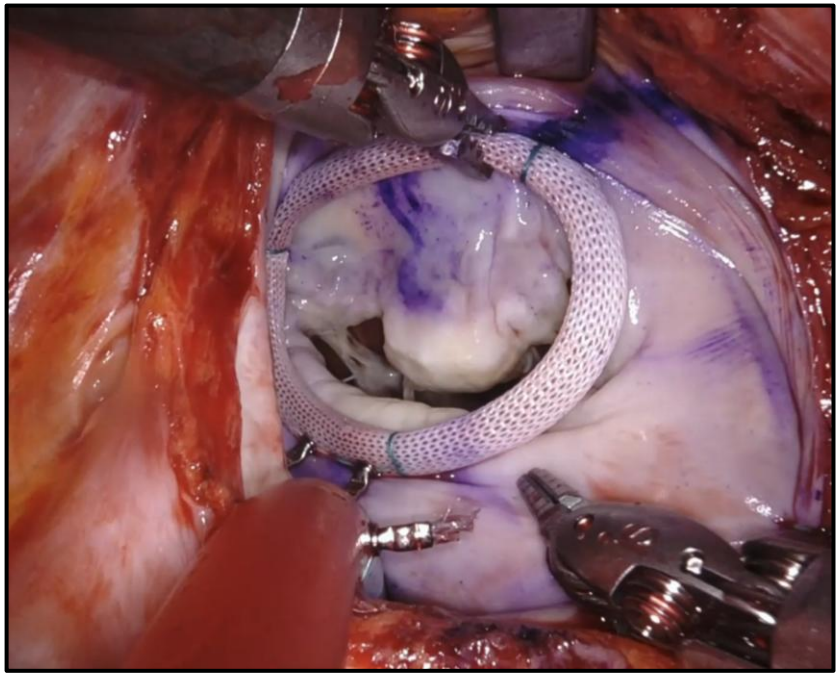
Arteficialní Gore-Tex chordy „Mohr“ („loops“)



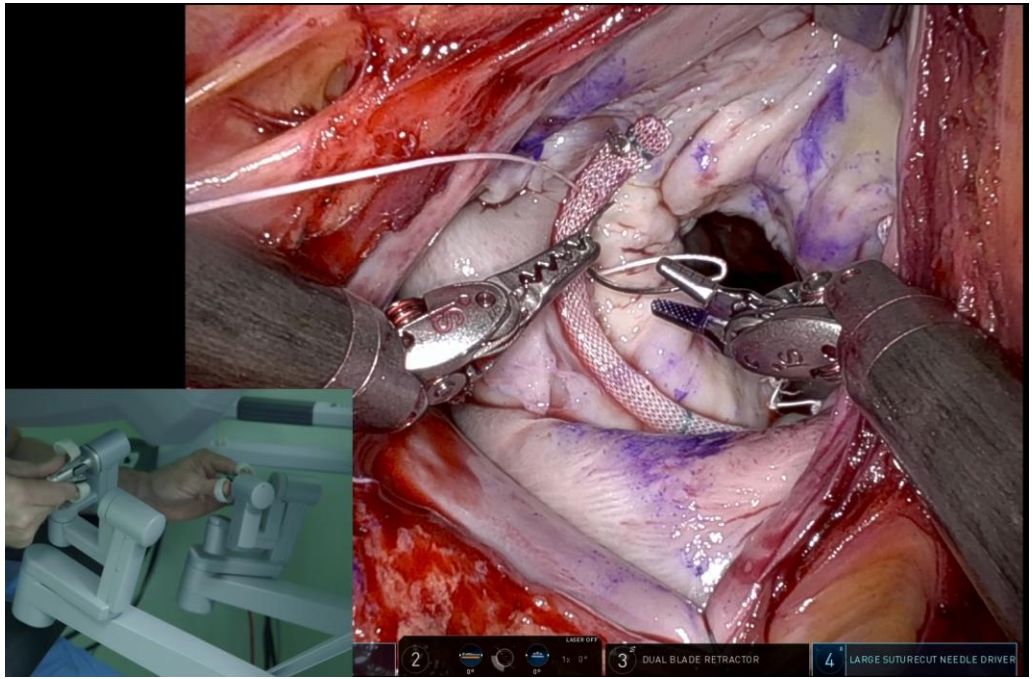
Komplexní rekonstrukce

Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně – Výběr a implantace prstence



FMR



DMR

Chirurgie mitrální chlopně

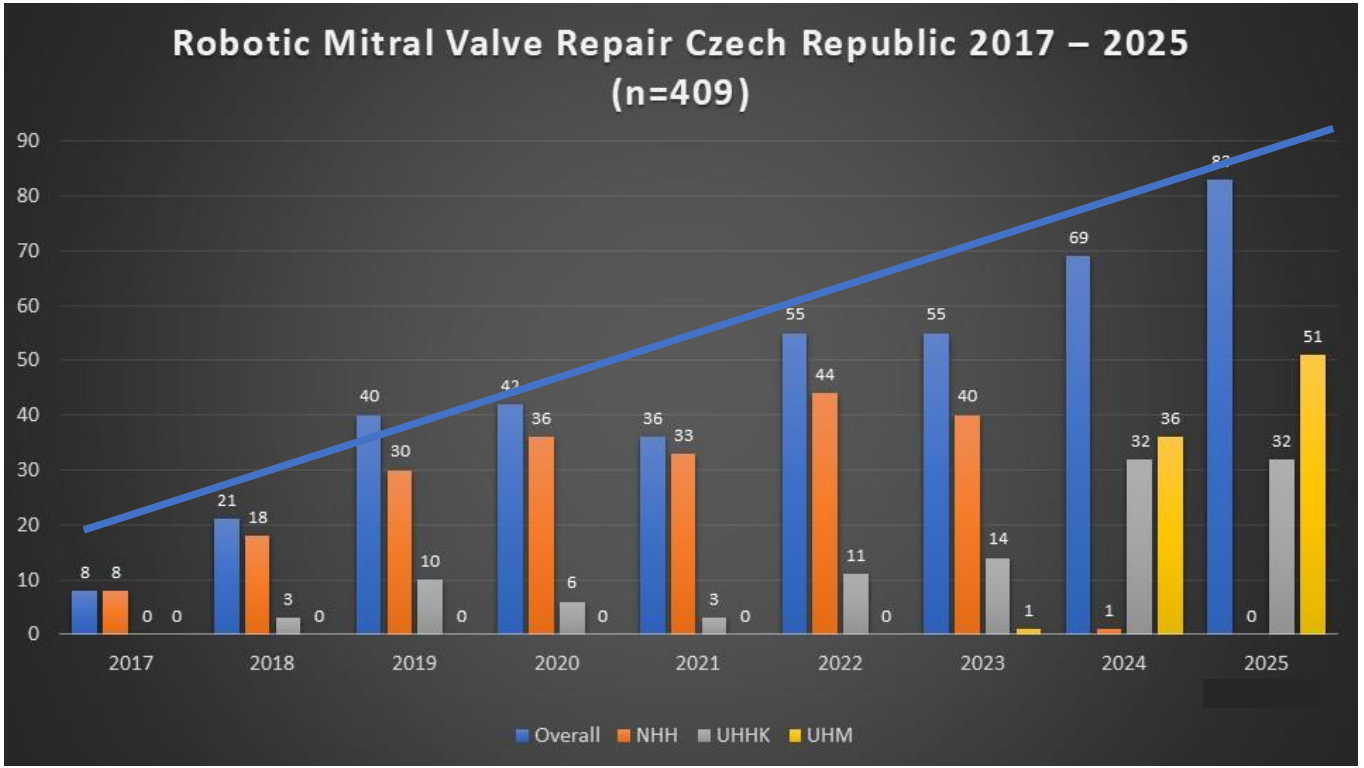
Robotická plastika mitrální chlopně

PLNĚ ENDOSKOPICKÝ VÝKON

- Bez mezižeberního rozvěrače = prakticky žádná pooperační bolest
- Plná stabilita hrudní stěny, bez porušení mezižeberních a hrudních svalů
- Návrat k plné fyzické aktivitě obvykle během 2 – 3 týdnů

Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně – ČR 2017 - 2025



Unpublished data: NNH, UHHK, UHM

Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně - osobní zkušenost

Robotic MVRep 2017 - 8/2025 – Single Surgeon (NHH, UHHK, UHM) *(n=219)*

Patients demografic data	
Number of patients (n)	219
Female sex (n)	63 (28,7 %)
Age (years)	50,7±13,9 (16 – 82)
Tricuspid regurgitation ≥ 3 gr (n)	14 (6,4 %)
Atrial fibrillation (n)	21 (9,6 %)
IHD (n)	0 (0 %)
NYHA (grade)	1,56±0,56 (1-3)

Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně - osobní zkušenost

Robotic MVRep 2017 - 8/2025 – Single Surgeon (NHH, UHHK, UHM) *(n=219)*

Surgical technique		
Valve repair (n)	219	(100 %)
Ring implantation (n)	216	(98,6 %)
Semirigid ring (Physio II®/Physio Flex®) (n)	214	(97,7 %)
Ring size (size)	35,1± 3,6	(28-40)
• Isolated ring (n)	44	(20,1%)
• Triangular resection (n)	42	(19,2 %)
• Neochords (n)	101	(46,1 %)
• Chordal transfer (n)	8	(3,7 %)
• Other (n)	26	(11,9 %)
TV repair	14	(6,4 %)
MAZE - cryo (n)	21	(9,6 %)

Chirurgie mitrální chlopně

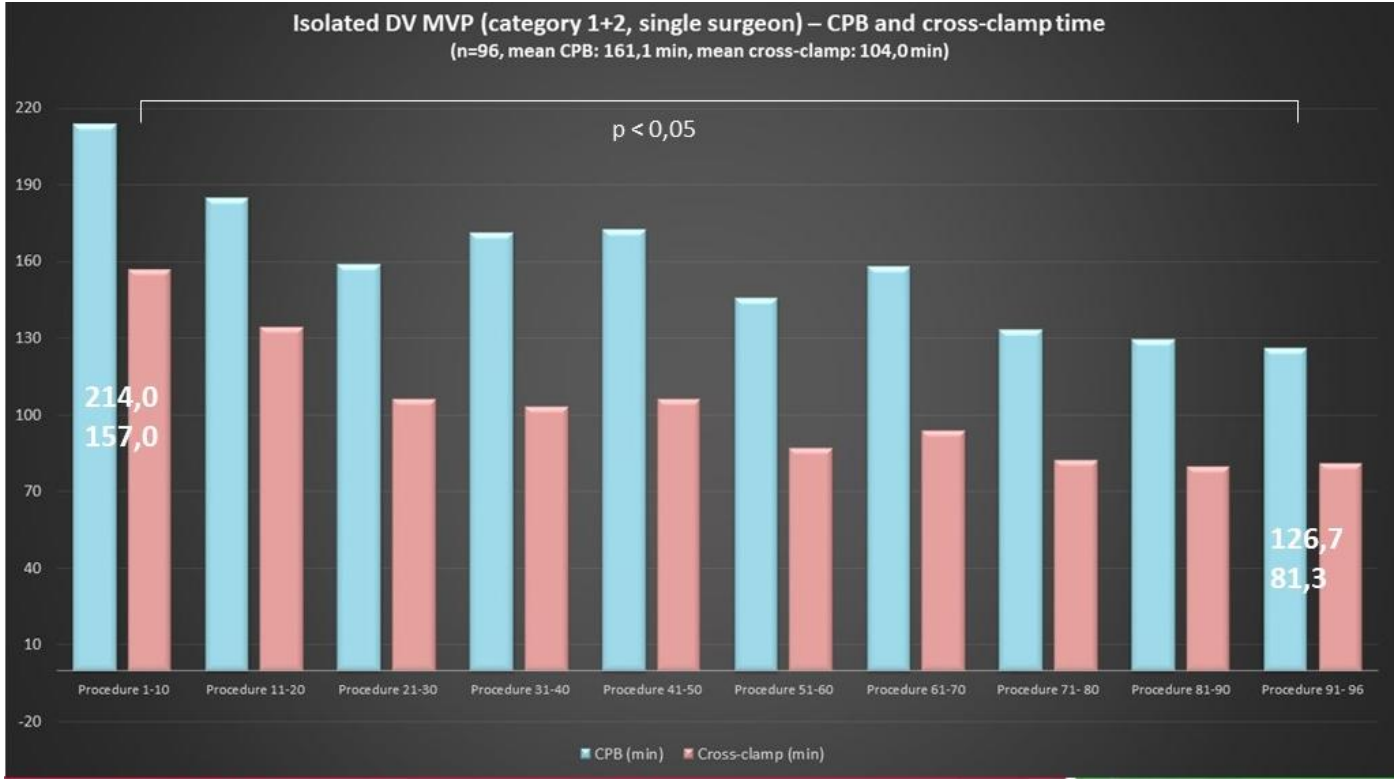
Robotická plastika mitrální chlopně - osobní zkušenost

Robotic MVRep 2017 - 8/2025 – Single Surgeon (NHH, UHHK, UHM) *(n=219)*

Early results		
Conversion – limited thoracotomy (n)	1	(0,45 %)
Conversion – sternotomy (n)	0	(0,0 %)
Early mitral valve reintervention (n)	1	(0,45 %)
Reexploration for bleeding (n)	3	(1, 4%)
Prolonged arteficial ventilation (n)	3	(1,4 %)
Postoperative severe LCO (n)	1	(0,45 %)
Lymphocele (n)	9	(4,1 %)
Stroke (n)	0	(0 %)
Mortality (30d) (n)	0	(0 %)

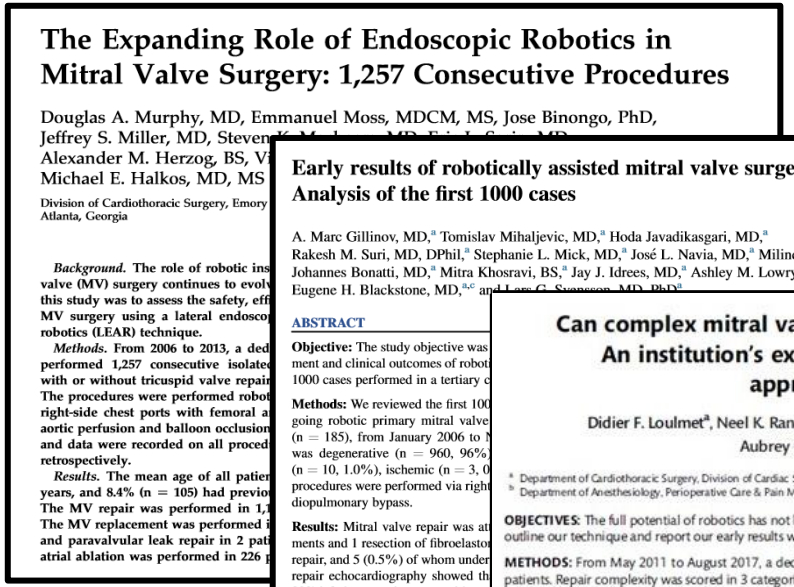
Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně



Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně - Evidence



The Expanding Role of Endoscopic Robotics in Mitral Valve Surgery: 1,257 Consecutive Procedures

Douglas A. Murphy, MD, Emmanuel Moss, MDCM, MS, Jose Binongo, PhD, Jeffrey S. Miller, MD, Steven K. [illegible], Alexander M. Herzog, BS, Vi[illegible], Michael E. Halkos, MD, MS

Division of Cardiothoracic Surgery, Emory, Atlanta, Georgia

Background. The role of robotic ins valve (MV) surgery continues to evolv this study was to assess the safety, eff MV surgery using a lateral endoscop robotics (LEAR) technique.

Methods. From 2006 to 2013, a ded performed 1,257 consecutive isolate with or without tricuspid valve repair The procedures were performed robot right-side chest ports with femoral a aortic perfusion and balloon occlusion and data were recorded on all proced retrospectively.

Results. The mean age of all patien years, and 8.4% (n = 105) had previo The MV repair was performed in 1,1 The MV replacement was performed i and paravalvular leak repair in 2 pati atrial ablation was performed in 226 p

Early results of robotically assisted mitral valve surgery: Analysis of the first 1000 cases

A. Marc Gillinov, MD,[a] Tomislav Mihaljevic, MD,[a] Hoda Javadikasgari, MD,[a] Rakesh M. Suri, MD, DPhil,[a] Stephanie L. Mick, MD,[a] José L. Navia, MD,[a] Milind Y. Desai, MD,[b] Johannes Bonatti, MD,[a] Mitra Khosravi, BS,[a] Jay J. Idrees, MD,[a] Ashley M. Lowry, MS,[c] Eugene H. Blackstone, MD,[a,c] and [illegible]

ABSTRACT

Objective: The study objective was ment and clinical outcomes of robot 1000 cases performed in a tertiary c

Methods: We reviewed the first 100 going robotic primary mitral valve (n = 185), from January 2006 to was degenerative (n = 960, 96%) (n = 10, 1.0%), ischemic (n = 3, 0 procedures were performed via right diopulmonary bypass.

Results: Mitral valve repair was at ments and 1 resection of fibroelastor repair, and 5 (0.5%) of whom under repair echocardiography showed th 992) left the operating room with no echocardiography showed that mit 97.9% of patients (915/935). There (1.4%) experienced a stroke; stroke to 0.8% in the second 500 patients. ischemic and cardiopulmonary bypa and intensive care unit and postoper

Conclusions: Robotic mitral valve valve repair and low operative mo algorithm-driven patient selection outcomes and procedural efficiency.

Can complex mitral valve repair be performed with robotics? An institution's experience utilizing a dedicated team approach in 500 patients†

Didier F. Loulmet[a], Neel K. Ranganath[a], Peter J. Neuburger[b], Robert G. Nampiaparampil[b], Aubrey C. Galloway[a] and Eugene A. Grossi[a,*]

[a] Department of Cardiothoracic Surgery, Division of Cardiac Surgery, NYU Langone Health, New York, NY, USA
[b] Department of Anesthesiology, Perioperative Care & Pain Medicine, Division of Cardiothoracic Anesthesia, NYU Langone Health, New York, NY, USA

OBJECTIVES: The full potential of robotics has not been achieved in terms of addressing the most challenging mitral valve (MV) cases. We outline our technique and report our early results with totally endoscopic robotic MV repair in a wide range of pathologies.

METHODS: From May 2011 to August 2017, a dedicated team attempted totally endoscopic robotic MV repair in 500 MV regurgitation patients. Repair complexity was scored in 3 categories. We analysed our sequential case experience by quartiles.

RESULTS: Patient mean age was 60.8 years (range 18–88). Aetiologies included: degenerative 382 (76.4%), functional 37 (7.4%), inflammatory 22 (4.4%) and others 59 (11.8%). Mitral annular calcification was present in 64 (12.8%) cases. Simple MV repair (annuloplasty alone or with 1 leaflet segment repair) was performed in 240 (48%) patients, complex (repair involving more than 1 segment on the same leaflet) in 140 (28%) patients and most complex (bileaflet repair or mitral annular calcification excision with atrioventricular groove repair) in 120 (24%) patients. Concomitant procedures included: left appendage closure (94.8%), patent foramen ovale/atrial septal defect (PFO/ASD) closure (19.6%), cryoablation (19.4%), tricuspid repair (6.2%) or hybrid percutaneous coronary revascularization (7.8%). The overall repair rate was 99.4%, with 0.6% early mortality and 1.2% stroke rate (0.2% permanent neurological deficit). Case complexity increased with our experience. Despite an increase in aortic occlusion and perfusion times (median 86.5 and 125 min) and a slight decrease in operating room extubation rate (overall 64%), length of hospital stay (median 4 days) and 30-day readmission rate (overall 3.6%) were not affected by the progressive inclusion of more complex cases.

CONCLUSIONS: Totally endoscopic robotic MV repair performed by a dedicated team allows one to address the entire spectrum of pathological complexity and provides consistent results.

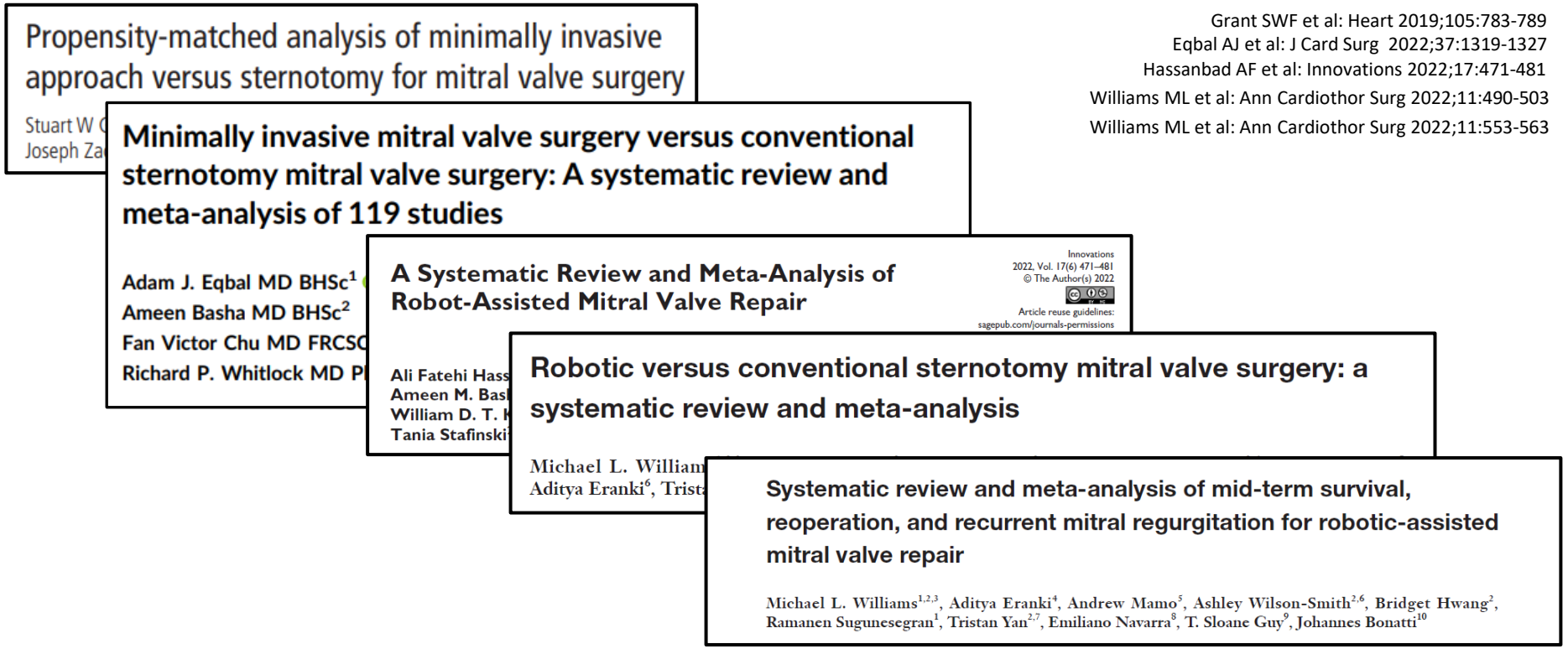
Keywords: Mitral valve • Robotics • Mitral repair • Mitral valve repair

- **2757 pacientů**
  - 2656 plastik MCH
  - 96 náhrad MCH
  - 395 LS MAZE
  - 171 plastik TCH
  - 105 Reoperací
- Konverze 2,1%
- Revize 2,1%
- Mortalita 0,5%
- CMP 1,0%

Murphy DA et al: Ann Thorac Surg 2015;100:1675-82
Gillinov M et al: J Thorac Cardiovasc Surg 2018;155:82-91
Loulmet D et al: Eur J Cardiothor Surg 2019;56:470-8

Chirurgie mitrální chlopně

Mini-invazivní a robotická plastika mitrální chlopně – Recentní evidence



Grant SWF et al: Heart 2019;105:783-789
Eqbal AJ et al: J Card Surg 2022;37:1319-1327
Hassanbad AF et al: Innovations 2022;17:471-481
Williams ML et al: Ann Cardiothor Surg 2022;11:490-503
Williams ML et al: Ann Cardiothor Surg 2022;11:553-563

Chirurgie mitrální chlopně

Mini-invazivní a robotická plastika mitrální chlopně – Recentní evidence

- **Mortalita, celkové komplikace a chirurgické výsledky plastiky srovnatelné s otevřenou technikou**
- **Poněkud delší časy mimotělního oběhu a svorky**
- **Nižší počet raných komplikací**
- **Nižší výskyt pooperační fibrilace síní**
- **Menší potřeba transfuzí**
- **Kratší doba umělé plicní ventilace**
- **Kratší pobyt na JIP**
- **Kratší celková doba hospitalizace**
- **Robotická technika umožňuje rutinní použití komplexních technik**
- **Jedna metaanalýza (Williams) – nižší mortalita u robotické techniky**
- **NENÍ VYŠŠÍ VÝSKYT CMP, DISEKCE A PARÉZY N. PHRENICUS**

Grant SWF et al: Heart 2019;105:783-789
Eqbal AJ et al: J Card Surg 2022;37:1319-1327
Hassanbad AF et al: Innovations 2022;17:471-481
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Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně – Recentní evidence

Robotic Mitral Valve Repair for Degenerative Mitral Regurgitation

Makoto Mori, MD, PhD,[1] Niharika Parsons, MD, MHSI,[2] Markus Krane, MD,[1] T. Sloane Guy, MD, MBA,[3] Eugene A. Grossi, MD,[4] Joseph A. Dearani, MD,[5] Robert H. Habib, PhD,[2] Vinay Badhwar, MD,[6] and Arnar Geirsson, MD[1]

ABSTRACT

BACKGROUND Contemporary national utilization and comparative safety data of robotic mitral valve repair for degenerative mitral regurgitation compared with nonrobotic approaches are lacking. The study aimed to characterize national trends of utilization and outcomes of robotic mitral repair of degenerative mitral regurgitation compared with sternotomy and thoracotomy approaches.

METHODS Patients undergoing intended mitral repair of degenerative mitral regurgitation in The Society of Thoracic Surgeons Adult Cardiac Surgery Database between 2015 and 2021 were examined. Mitral repair was performed in 61,322 patients. Descriptive analyses characterized center-level volumes and outcomes. Propensity score matching separately identified 5540 pairs of robotic vs thoracotomy approaches and 6962 pairs of robotic vs sternotomy approaches. Outcomes were operative mortality, composite mortality and major morbidity, postoperative length of stay, and conversion to mitral replacement.

RESULTS Through the 7-year study period, 116 surgeons across 103 hospitals performed mitral repair robotically. The proportion of robotic cases increased from 10.9% (949 of 8712) in 2015 to 14.6% (1274 of 8730) in 2021. In both robotic-thoracotomy and robotic-sternotomy matched pairs, mortality and morbidity were not significantly different, whereas the robotic approach had lower conversion (1.2% vs 3.1% for robotic-thoracotomy and 1.0% vs 3.7% for robotic-sternotomy), shorter length of stay, and fewer 30-day readmissions. Mortality and morbidity were lower at higher-volume centers, crossing the national mean mortality and morbidity at a cumulative robotic mitral repair case of 40.

CONCLUSIONS Robotic mitral repair is a safe and effective approach and is associated with comparable mortality and morbidity, a lower conversion rate, a shorter length of stay, and fewer 30-day readmissions than thoracotomy or sternotomy approaches.

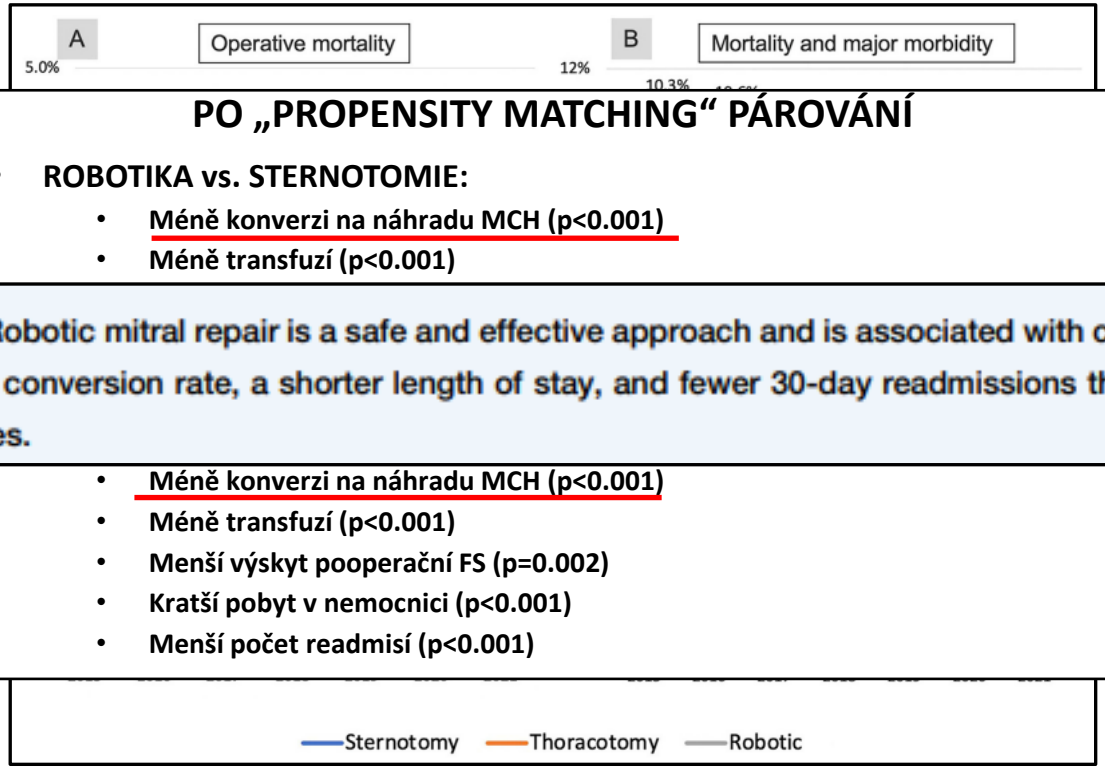
(Ann Thorac Surg 2023;■:■-■)
Published by Elsevier Inc. on behalf of The Society of Thoracic Surgeons

- STS Adult Cardiac Surgical Database 2015 - 2021
- 63,122 pacientů s plastikou MCH pro primární MR
  - 7692 Robotických plastik MCH
  - 15,725 Plastik MCH z torakotomie
  - 39,705 Plastik MCH ze sternotomie
- „Propensity score matching“
  - Robotika vs. torakotomie - 5540 patients
  - Robotika vs. sternotomie – 6962 patients
- Mortalita 1,1%
- Revize 3,1%
- CMP 1,2%

Mori M et al: Ann Thorac Surg 2024,117(1):96-104

Chirurgie mitrální chlopně

Robotická plastika mitrální chlopně – Recentní evidence



PO „PROPENSITY MATCHING“ PÁROVÁNÍ

- **ROBOTIKA vs. STERNOTOMIE:**
  - **Méně konverzi na náhradu MCH (p<0.001)**
  - **Méně transfuzí (p<0.001)**

CONCLUSIONS Robotic mitral repair is a safe and effective approach and is associated with comparable mortality and morbidity, a lower conversion rate, a shorter length of stay, and fewer 30-day readmissions than thoracotomy or sternotomy approaches.

- **Méně konverzi na náhradu MCH (p<0.001)**
- **Méně transfuzí (p<0.001)**
- **Menší výskyt pooperační FS (p=0.002)**
- **Kratší pobyt v nemocnici (p<0.001)**
- **Menší počet readmisí (p<0.001)**

Mori M et al: Ann Thorac Surg 2024,117(1):96-104

Chirurgie mitrální chlopně

Robotická kardiochirurgie - AI

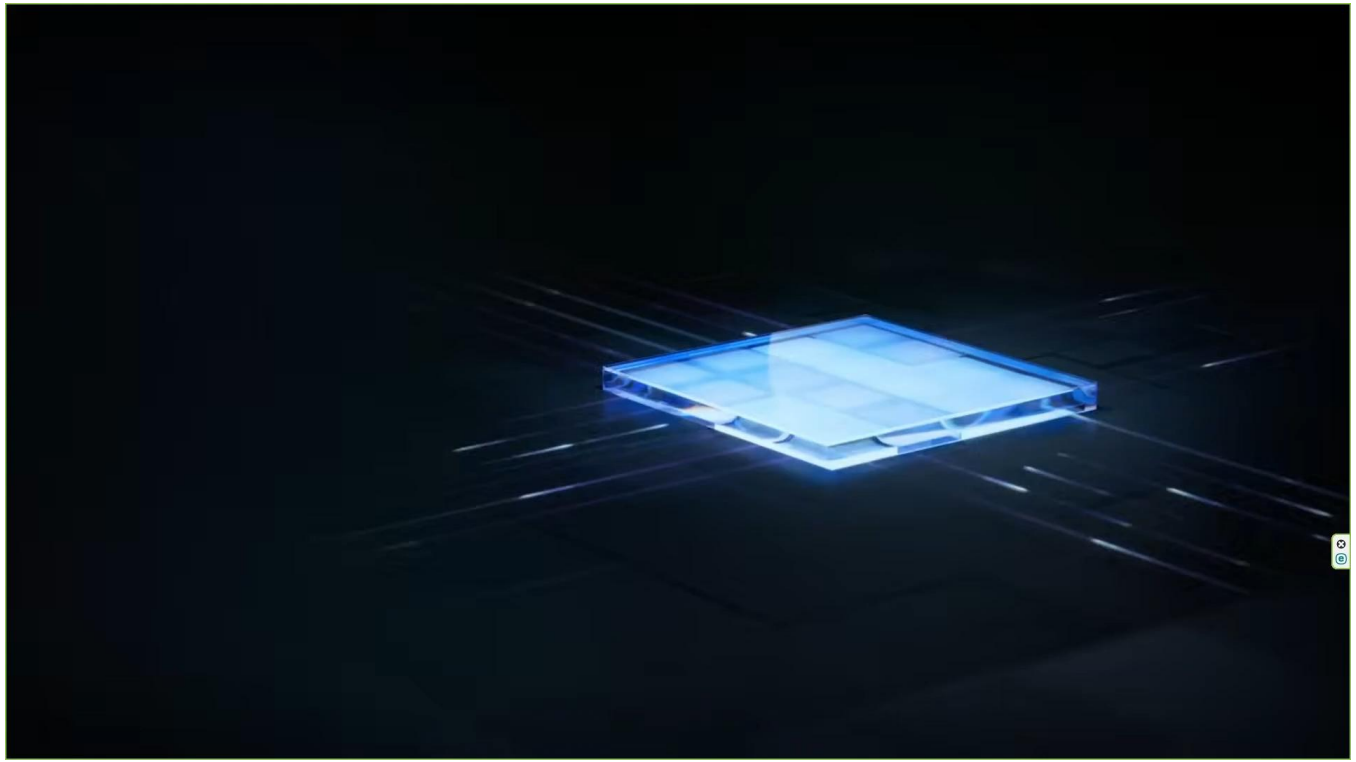
Chirurgie mitrální chlopně

Robotická kardiochirurgie - AI

- **Automatické vyhodnocení dovedností – ukládání peroperačních nahrávek a automatická analýza pohybů nástrojů**
- **Vytváření vysoce specializované zpětné vazby pro chirurgický výcvik**
- Pokročilá peroperační metrika jako například měření síly a taktilní zpětné vazby
- Zdokonalená detekce pozitivních chirurgických resekčních hranic
- Automatické provádění některých kroků (např. uzlení stehů…)
- KCH: Pokročilá fůze TEE obrazu a nálezu na chlopni, virtuální měření vzdáleností, virtuální mírky na chlopně atd..

Chirurgie mitrální chlopně

Robotická kardiochirurgie - AI



Závěry

- Indikace k záchovným operacím mitrálních chlopní se posouvají k asymptomatickým pacientům bez dilatace LK
- Mini-invazivní a robotické přístupy jsou standardizované chirurgické metody s reprodukovatelnými a predikovatelnými výsledky a umožňují komplexní výkony
- Krátko i dlouhodobé výsledky jsou srovnatelné s výsledky záchovných operací mitrální chlopně ze střední sternotomie
- Miniinvazivní i robotický přístup mají potenciál stát se standardem léčby primární mitrální regurgitace

Děkuji za pozornost !!!!