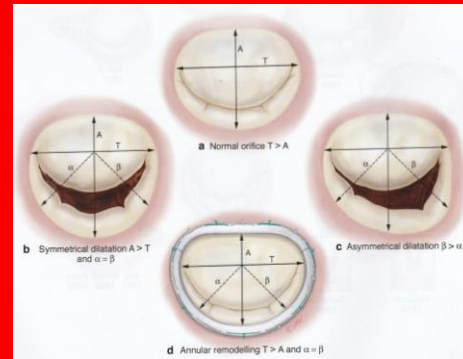


# ROBOTICKÁ PLASTIKA MITRÁLNÍ CHLOPNĚ – Potkala se guidelines s klinickou praxí?

Štěpán ČERNÝ

Klinika kardiovaskulární chirurgie

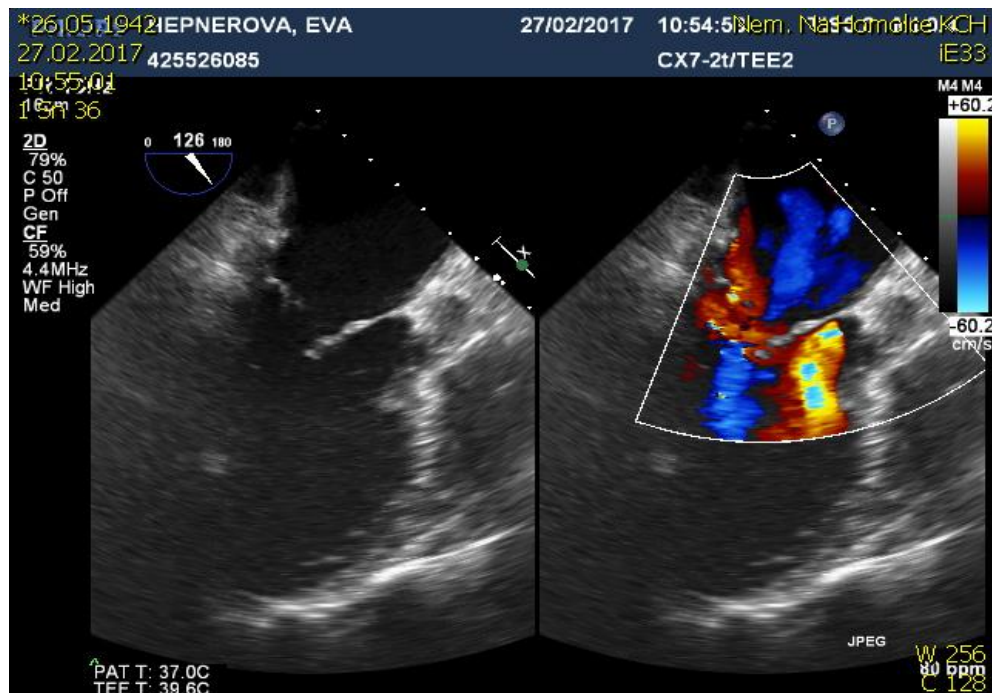
FN Motol, Praha



# Robotická plastika MCH



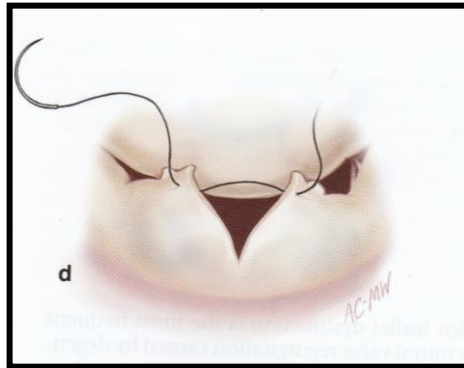
## Primární MR - TEE



ERO  $\geq 0,4 \text{ cm}^2$  RV  $\geq 60\text{mL}$

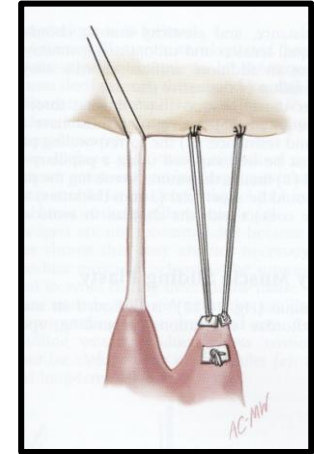
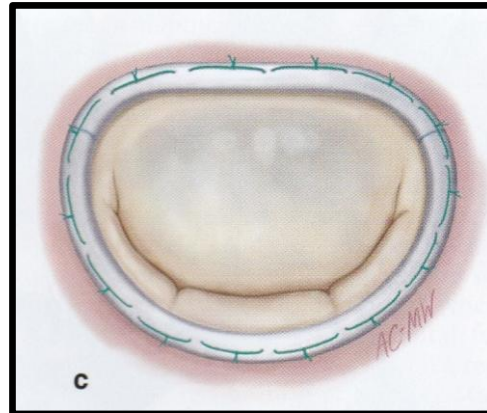
# Robotická plastika MCH

Primární MR – Chirurgická plastika chlopně



**KOREKCE LÉZE !!!!!**

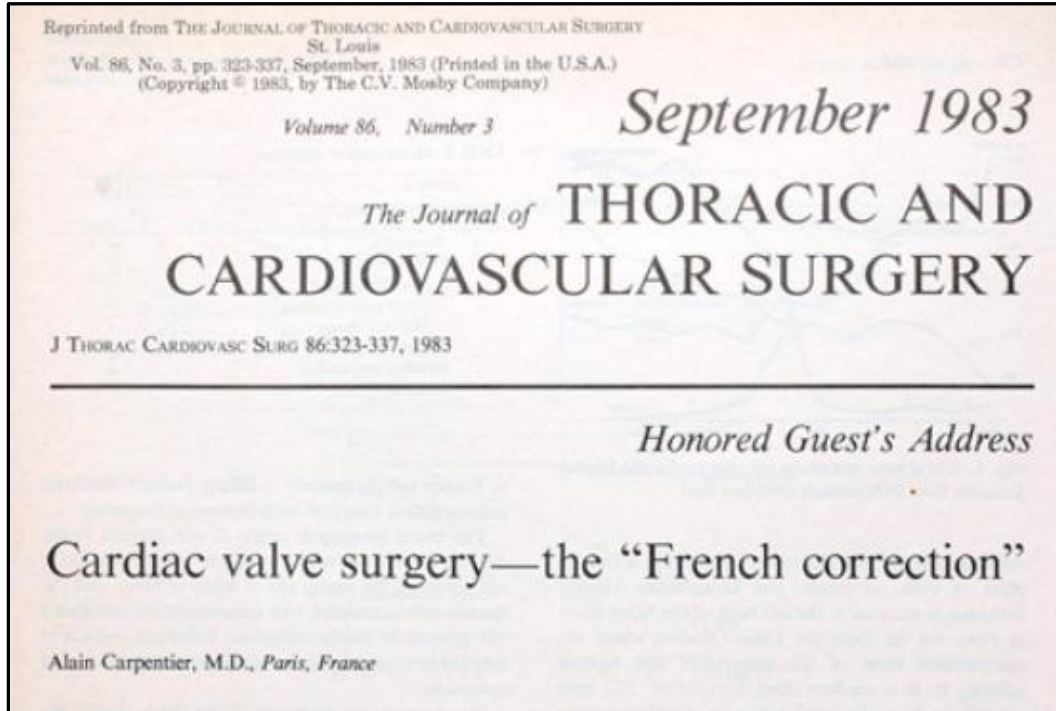
**REMODELACE ANULU !!!!!**



# Robotická plastika MCH



## Primární MR – Chirurgická plastika chlopně



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

# Robotická plastika MCH



Robotika



ROBOTIKA

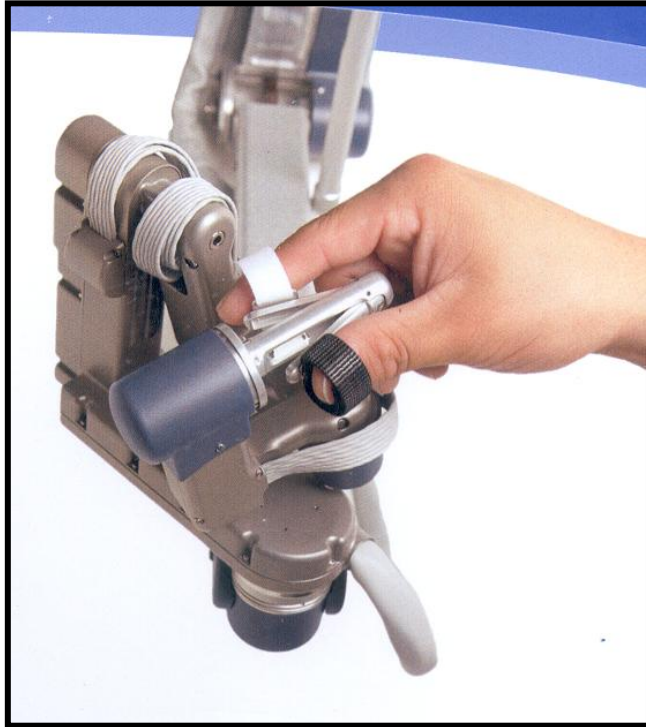
=

TELEMANIPULACE

# Robotická plastika MCH



Robotika



ROBOTIKA

=

TELEMANIPULACE

# Robotická plastika MCH



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,  $58 \pm 13$  years [range, 12-90]; mean LVEF,  $55\% \pm 9\%$ ) with degenerative mitral valve regurgitation and prolapse (anterior leaflet:  $n = 42$ , 6%; posterior leaflet:  $n = 556$ , 74%; bi-leaflet:  $n = 146$ , 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  $99.2\% \pm 0.3\%$  and  $97.4\% \pm 0.8\%$ , respectively. Seven-year freedom from reoperation was  $97.1\% \pm 0.6\%$ . 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%

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

# Robotická plastika MCH



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 increased (n = 57/25%) in era 3. Median length of stay decreased (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;■:■-■)

© 2015 by The Society of Thoracic Surgeons

0.18%

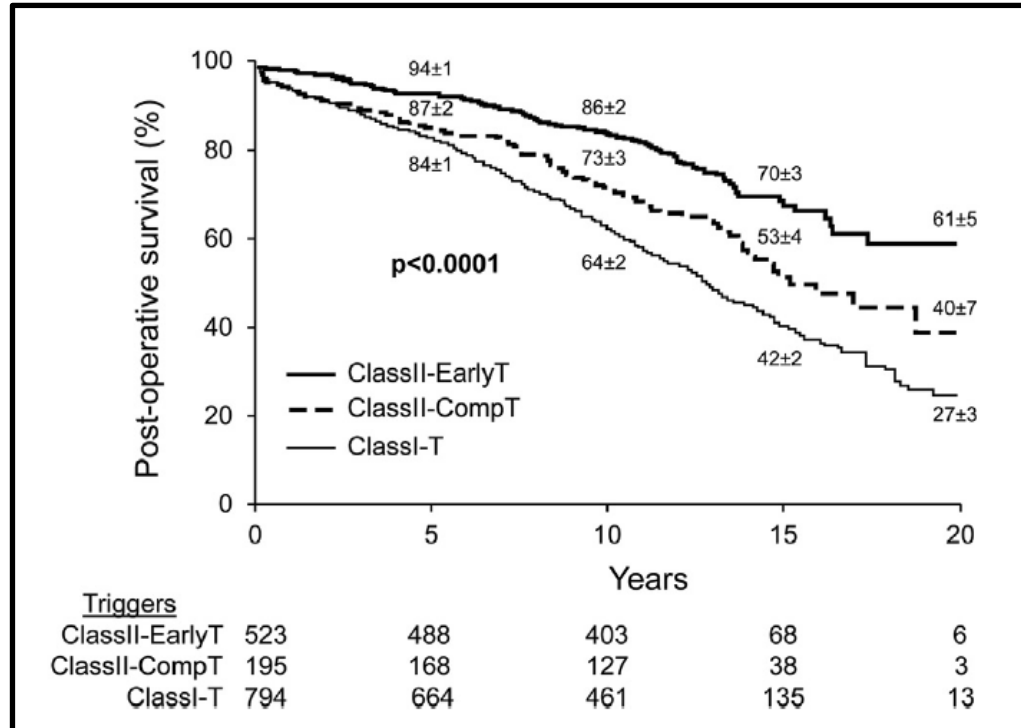
Yazdchi F et al: *Ann Thorac Surg* 2015;99(6):1992-2000



# Robotická plastika MCH



## Primární MR – Class I trigery vs. Class II trigery



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

# Robotická plastika MCH



## Primární MR - ESC/EACTS Guidelines

**ESC**  
European Society  
of Cardiology

European Heart Journal (2021) 00, 1–72  
doi:10.1093/eurheartj/ehab395

ESC/EACTS GUIDELINES

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2021 ESC/EACTS Guidelines for the  
management of valvular heart disease

Developed by the Task Force for the management of valvular heart  
disease of the European Society of Cardiology (ESC) and the  
European Association for Cardio-Thoracic Surgery (EACTS)

New or Revised	Recommendations in 2017 version	Class	Recommendations in 2021 version	Class
Revised	Surgery should be considered in <u>asymptomatic patients</u> with preserved LV function ( <u>LVESD &lt;45 mm and LVEF &gt;60%</u> ) and AF secondary to mitral regurgitation or pulmonary hypertension (SPAP at rest >50 mmHg).	<b>IIa</b>	Surgery should be considered in asymptomatic patients with preserved LV function ( <u>LVESD &lt;40 mm and LVEF &gt;60%</u> ) and AF secondary to mitral regurgitation or pulmonary hypertension (SPAP at rest >50 mmHg).	<b>IIa</b>
Revised	Surgery should be considered in asymptomatic patients with preserved LVEF (>60%) and <u>LVESD 40–44 mm</u> when a durable repair is likely, surgical risk is low, the repair is performed in a Heart Valve Centre and at least one of the following findings is present: <ul style="list-style-type: none"> <li>● flail leaflet or;</li> <li>● presence of significant LA dilatation (volume index <math>\geq 60</math> mL/m<sup>2</sup> BSA) in sinus rhythm.</li> </ul>	<b>IIa</b>	Surgical mitral valve repair should be considered in <u>low-risk asymptomatic patients</u> with LVEF >60%, <u>LVESD &lt;40 mm and significant LA dilatation</u> (volume index $\geq 60$ mL/m <sup>2</sup> or diameter $\geq 55$ mm) when performed in a <u>Heart Valve Centre and a durable repair is likely</u> .	<b>IIa</b>

# Robotická plastika MCH

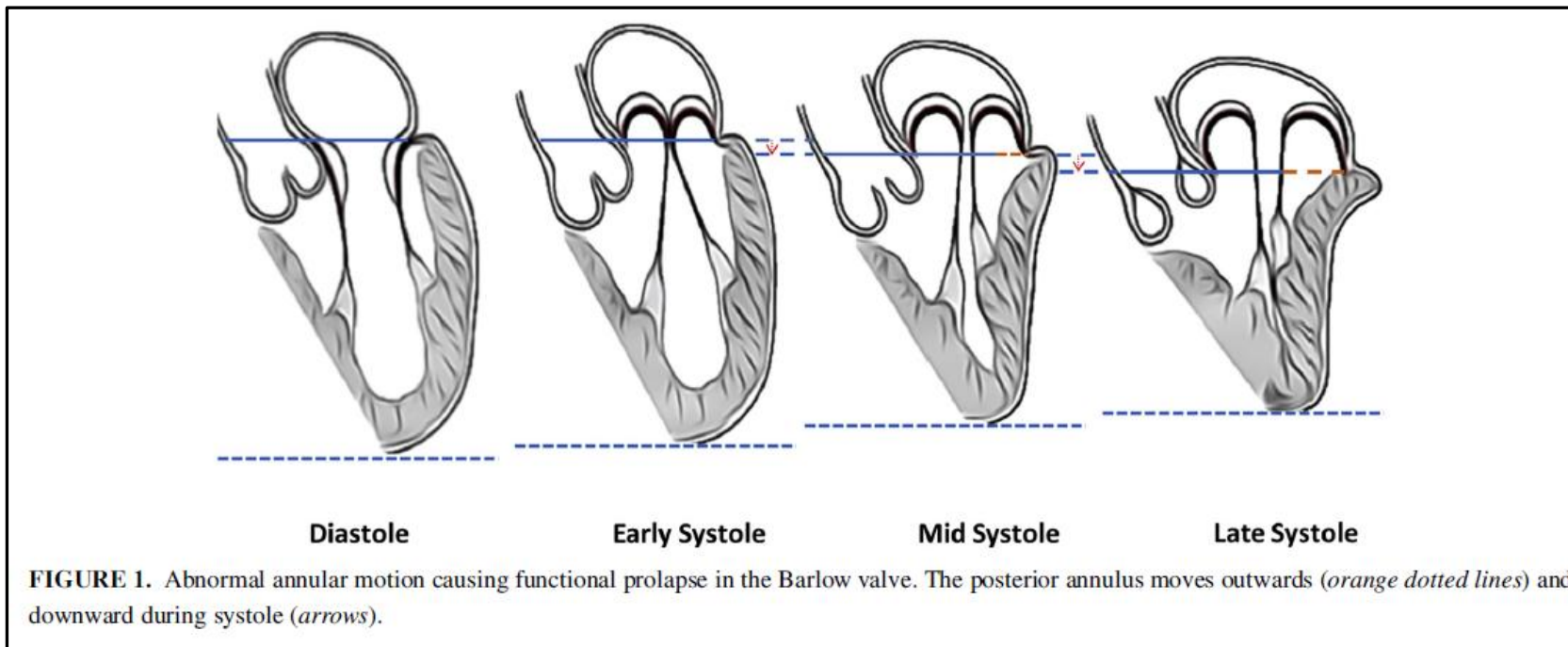


## Primární MR - ESC/EACTS Guidelines

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
Mitral valve repair is the recommended surgical technique when the results are expected to be durable [293–296].	I	B
Surgery is recommended in symptomatic patients who are operable and not high risk [293–296].	I	B
Surgery is recommended in asymptomatic patients with LV dysfunction (LVESD $\geq$ 40 mm and/or LVEF $<$ 60%) [277, 286, 292].	I	B
Surgery should be considered in asymptomatic patients with preserved LV function (LVESD $<$ 40 mm and LVEF $>$ 60%) and AF secondary to mitral regurgitation or pulmonary hypertension <sup>c</sup> (SPAP at rest $>$ 50 mmHg) [285, 289].	IIa	B
Surgical mitral valve repair should be considered in low-risk asymptomatic patients with LVEF $>$ 60%, LVESD $<$ 40 mm <sup>3</sup> and significant LA dilatation (volume index $>$ 60 mL/m <sup>2</sup> or diameter $>$ 55 mm) when performed in a Heart Valve Centre and a durable repair is likely [285, 288].	IIa	B
TEER may be considered in symptomatic patients who fulfil the echocardiographic criteria of eligibility, are judged inoperable or at high surgical risk by the Heart Team and for whom the procedure is not considered futile [299–302].	IIb	B

# Robotická plastika MCH

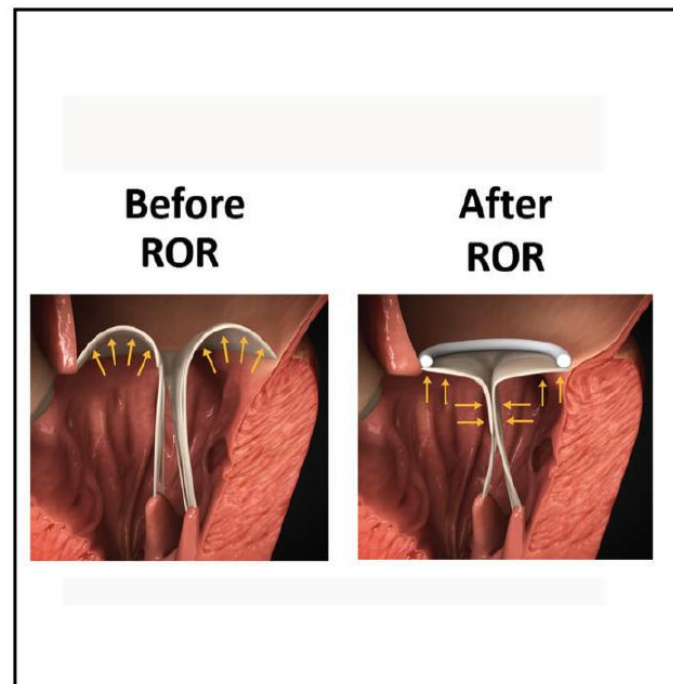
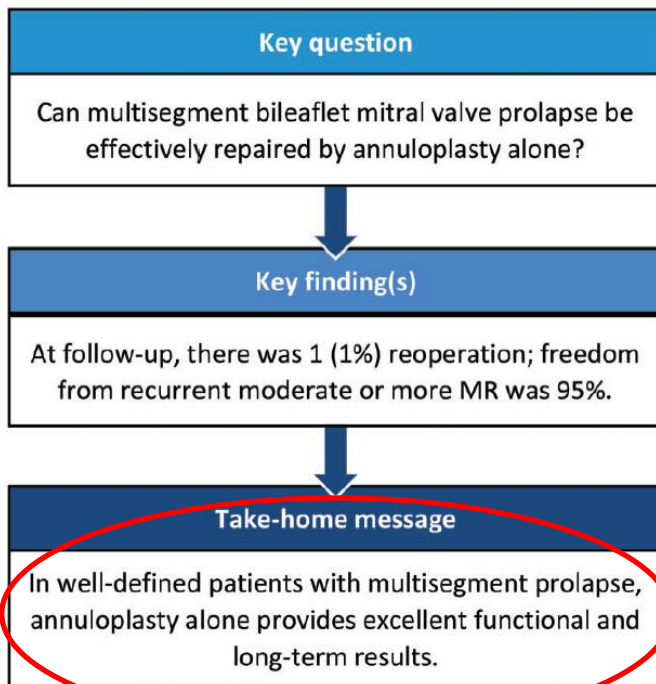
## Primární MR – Barlow´s disease – „bileaflet prolapse“



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

# Robotická plastika MCH

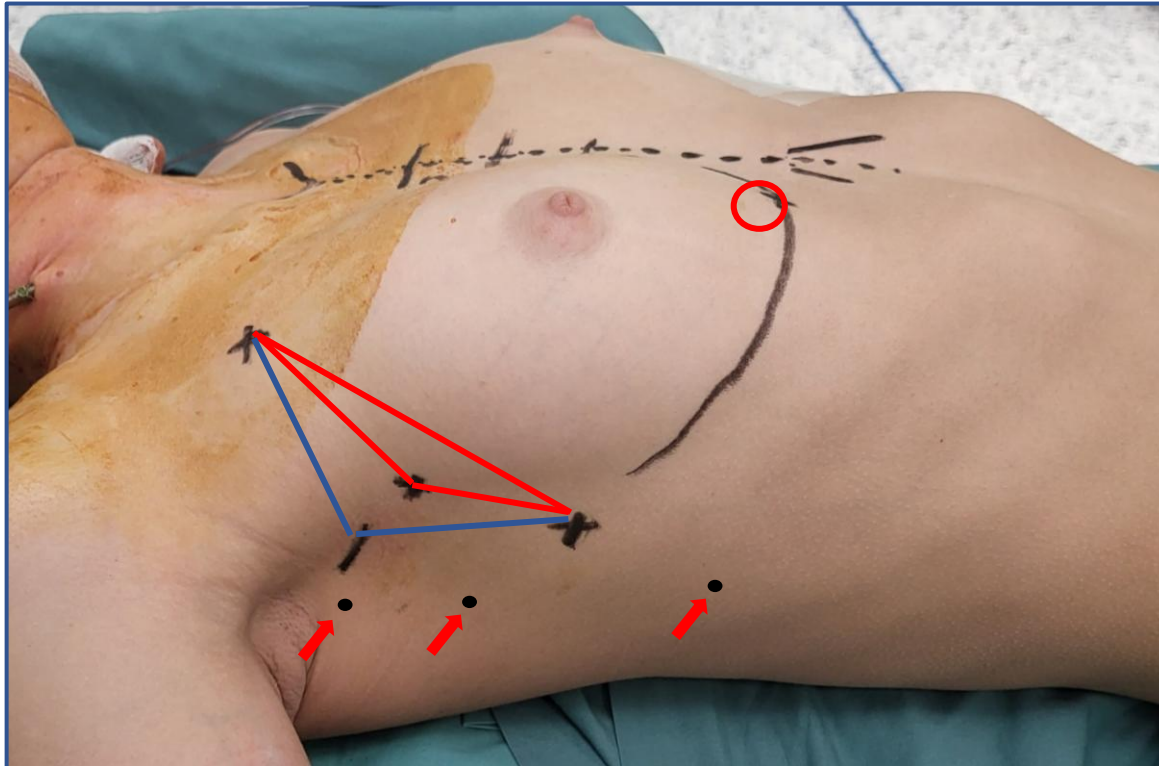
## Primární MR – Barlow's disease – „bileaflet prolapse“



# Robotická plastika MCH



## Chirurgická technika



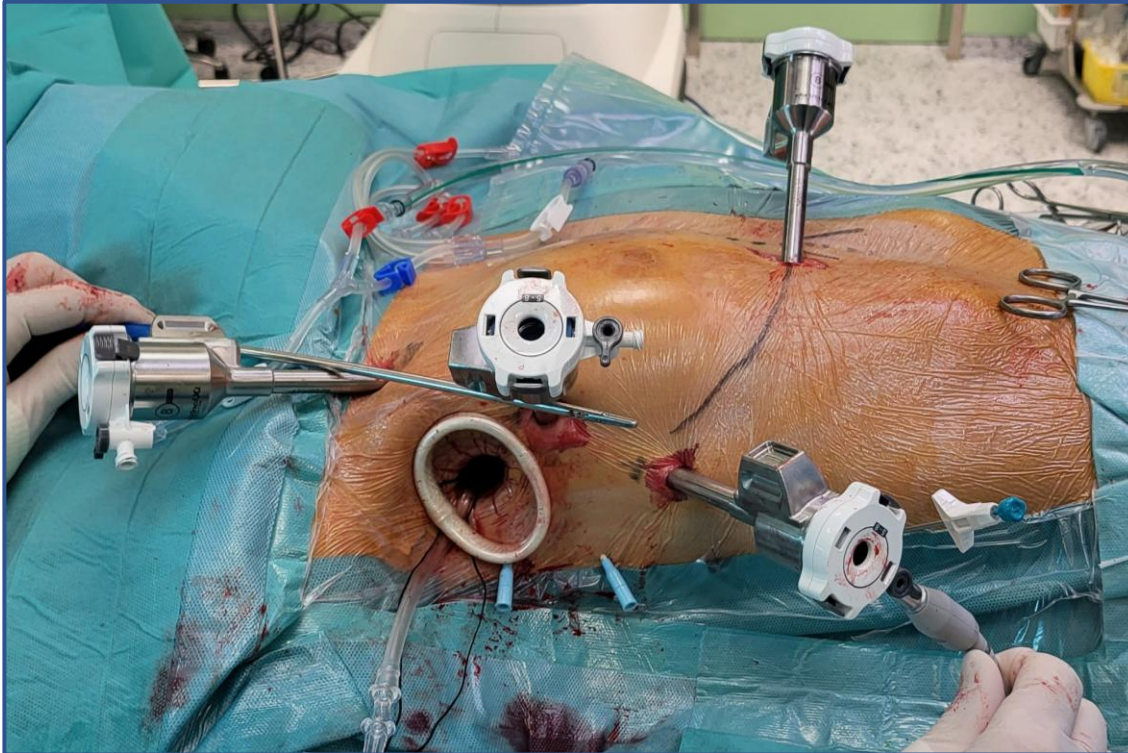
## ROZMÍSTĚNÍ PORTŮ

- 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

# Robotická plastika MCH



## Chirurgická technika



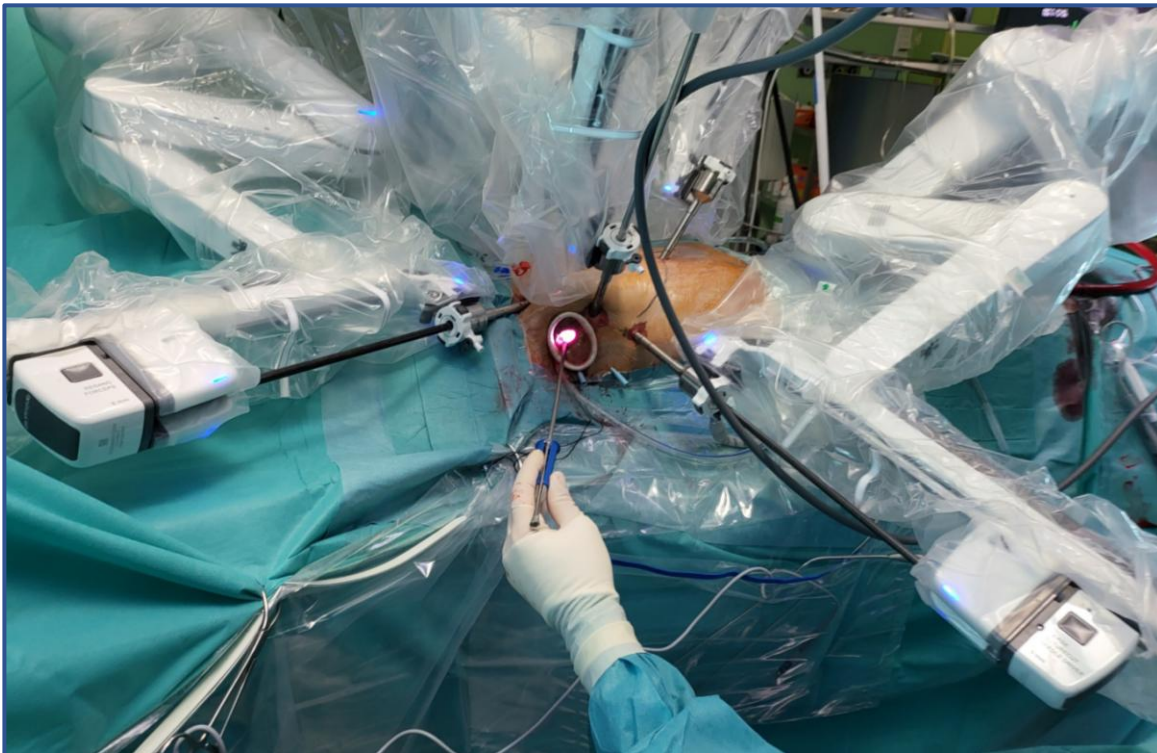
## ROZMÍSTĚNÍ PORTŮ

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- 2, 3 a 5 mezižebří pro robotické nástroje a kameru
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- Perikardiální a brániční trakční stehy

# Robotická plastika MCH



## Chirurgická technika



## DOKOVÁNÍ ROBOTA

- Trokary jsou připojeny k robotickým ramenům
- Se systémem IV. generace nedochází k žádným konfliktům ramen
- Dynamický LS rozvěrač – nezávislé pohyby
- Asistentký port:
  - „soft tissue retractor“ – 25 mm (1“)
  - Žádné roztahování žebér – jedinou limitací je velikost ringu



# Robotická plastika MCH

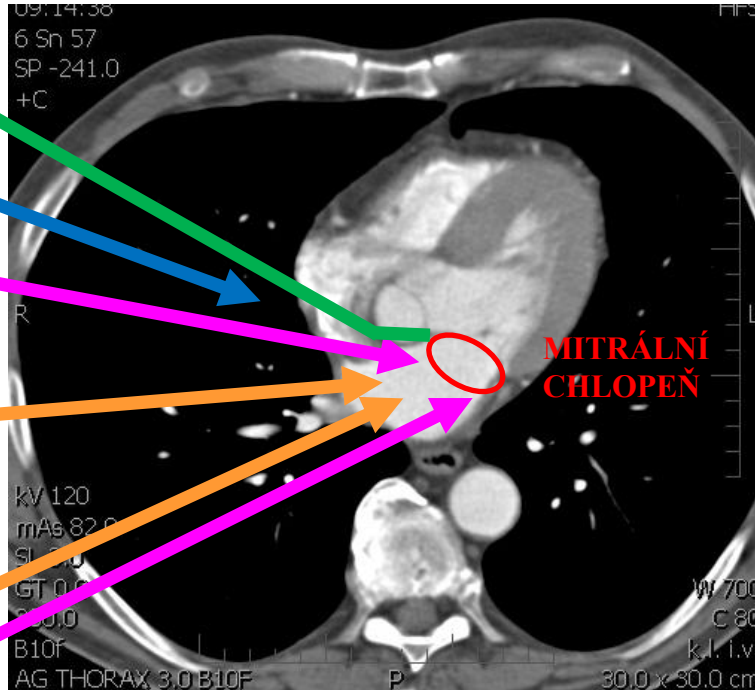
## Chirurgická technika

DYNAMICKÝ LS  
ROZVĚRAČ

3D  
CAMERA

ROBOTICKÉ  
NÁSTROJE

ASISTUJÍCÍ  
NÁSTROJ(E)



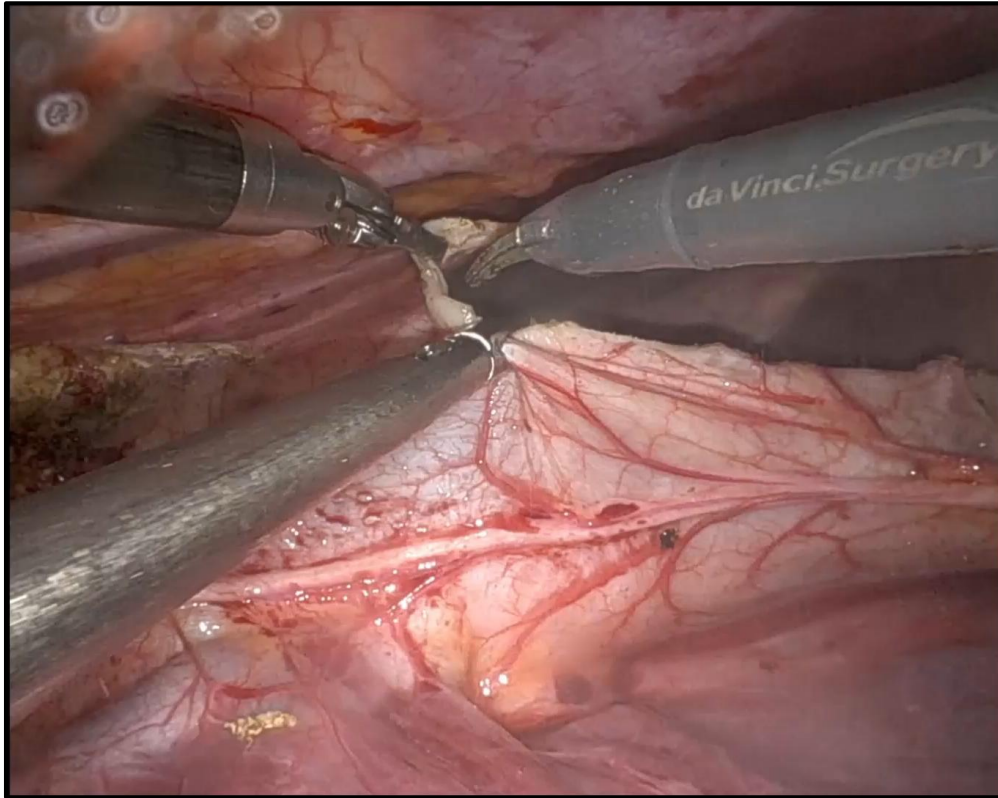
## OPERAČNÍ POLE

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

# Robotická plastika MCH



## Chirurgická technika



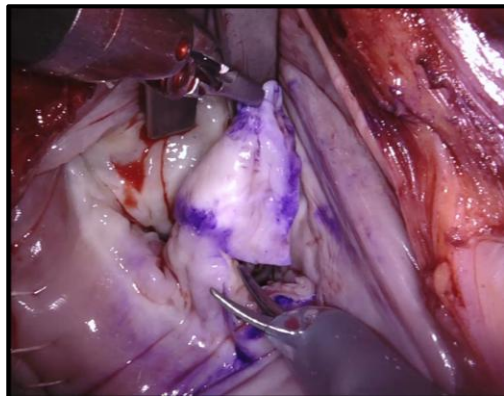
## PLNĚ ENDOSKOPICKÝ VÝKON

- 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

# Robotická plastika MCH



FN MOTOL



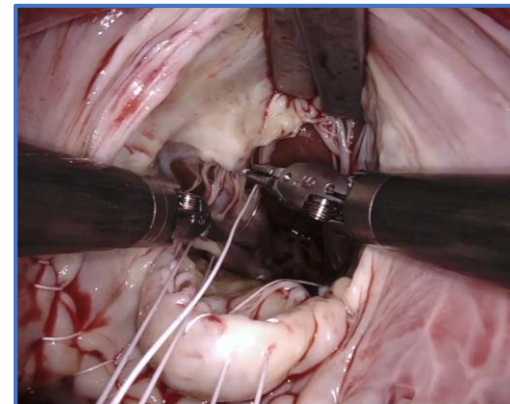
## Techniky plastiky mitrální chlopně



Triangulární  
resekce



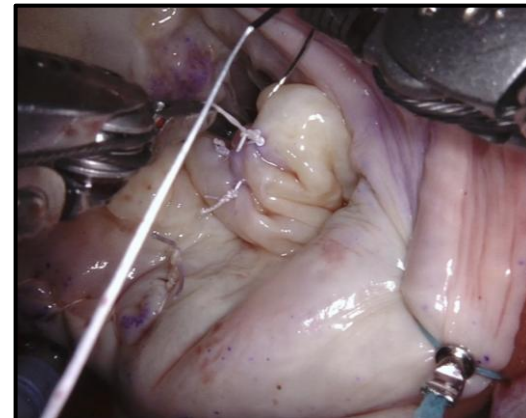
Arteficiální Gore-Tex  
chordy "David"



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



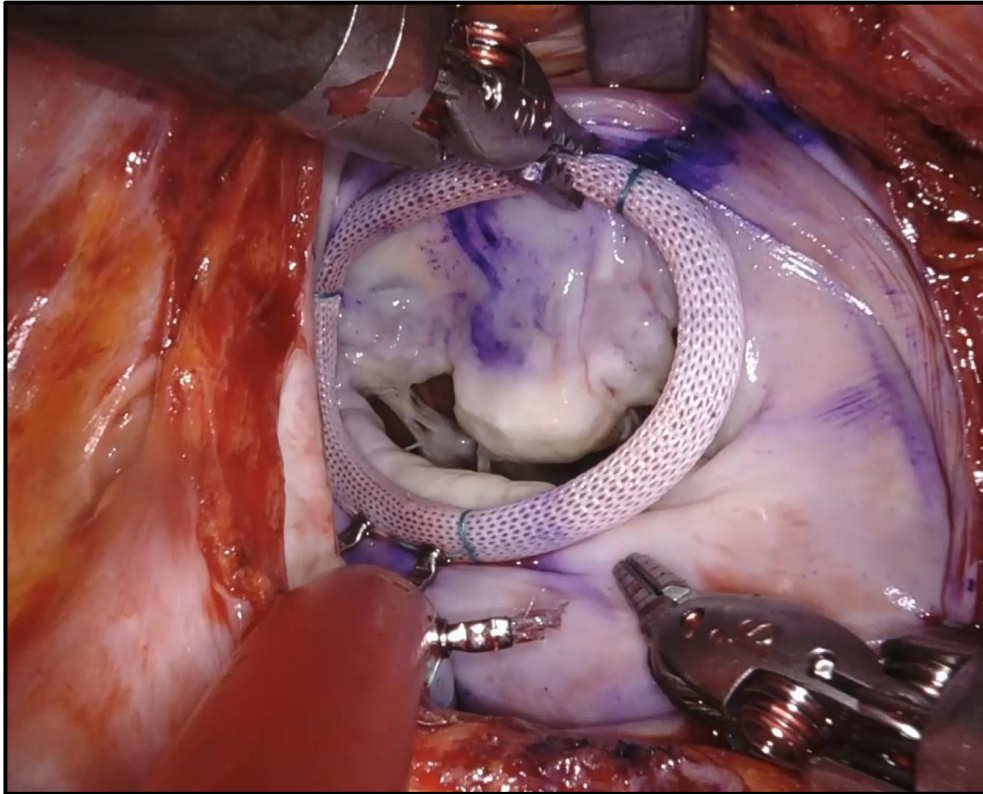
Komplexní  
rekonstrukce



# Robotická plastika MCH



## Chirurgická technika



## IMPLANTACE PRSTENCE

- Není potřeba kompromitovat techniku plastiky (bandy, pokračující stehy atd.)
- Implantace plného semirigidního prstence (principy remodelační anuloplastiky dle Carpentiera)
- „Knot fasteneres“ (CorKnot®) – jednotlivé stehy
- Další zjednodušení a vylepšení s novými ringy (Physio Flex®)

# Robotická plastika MCH



## Chirurgická technika



## PLNĚ ENDOSKOPICKÝ VÝKON

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

# Robotická plastika MCH



## Osobní zkušenost

Robotic MVRep 2017-2024 – Single Surgeon (NHH, UHHK, UHM)

Patients demographic data		
Number of patients (n)	155	
Female sex (n)	49	(31,6 %)
Age (years)	50,9 ± 13,8	(20 – 78)
Tricuspid regurgitation ≥ 3 gr (n)	7	(4,5 %)
Atrial fibrillation (n)	12	(7,7 %)
IHD (n)	0	(0 %)
NYHA (grade)	1,56 ± 0,56	(1-3)

# Robotická plastika MCH



## Osobní zkušenost

Robotic MVRep 2017-2024 – Single Surgeon (NHH, UHHK, UHM)

Surgical technique		
Valve repair (n)	155	(100 %)
Ring implantation (n)	155	(100 %)
Semirigid ring (Physio II®+PhysioFlex®) (n)	153	(98,7 %)
Ring size (size)	35,1 ± 3,6	(28-40)
• Isolated ring (n)	37	(20,4%)
• Triangular resection (n)	52	(33,6 %)
• Neochords (n)	58	(37,2 %)
• Chordal transfer (n)	7	(4,5 %)
• Other (n)	26	(16,8 %)
TV repair	7	(4,5 %)
MAZE - cryo (n)	12	(7,7 %)

# Robotická plastika MCH



## Osobní zkušenost

Robotic MVRep 2017-2024 – Single Surgeon (NHH, UHHK, UHM)

Early results		
Conversion – limited thoracotomy (n)	1	(0,6 %)
Conversion – sternotomy (n)	0	(0,0 %)
Early mitral valve reintervention (n)	0	(0,0 %)
Reexploration for bleeding (n)	3	(1,9 %)
Prolonged arteficial ventilation (n)	2	(1,3 %)
Postoperative severe LCO (n)	1	(0,6 %)
Lymphocele (n)	8	(5,3 %)
Stroke (n)	0	(0 %)
Mortality (30d) (n)	0	(0 %)





## 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. Malhotra, MD, FRCPC, Alexander M. Herzog, BS, V Michael E. Halkos, MD, MS

Division of Cardiothoracic Surgery, Emory University School of Medicine, Atlanta, Georgia

**Background.** The role of robotic mitral valve (MV) surgery continues to evolve. This study was to assess the safety, efficacy, and outcomes of robotic MV surgery using a lateral endoscopic robotic (LEAR) technique.

**Methods.** From 2006 to 2013, a dedicated team performed 1,257 consecutive isolated mitral valve repairs with or without tricuspid valve repair. The procedures were performed robotically through right-side chest ports with femoral aortic perfusion and balloon occlusion. All patients were recorded on all procedures.

**Results.** The mean age of all patients was 60.8 years, and 8.4% (n = 105) had previous mitral valve repair. The MV repair was performed in 1,152 patients. The MV replacement was performed in 105 patients and paravalvular leak repair in 2 patients. Atrial ablation was performed in 226 patients.

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

A. Marc Gillinov, MD,<sup>a</sup> Tomislav Mihaljevic, MD,<sup>a</sup> Hoda Javadikasgari, MD,<sup>a</sup> Rakesh M. Suri, MD, DPhil,<sup>a</sup> Stephanie L. Mick, MD,<sup>a</sup> José L. Navia, MD,<sup>a</sup> Milind Y. Desai, MD,<sup>b</sup> Johannes Bonatti, MD,<sup>a</sup> Mitra Khosravi, BS,<sup>a</sup> Jay J. Idrees, MD,<sup>a</sup> Ashley M. Lowry, MS,<sup>a</sup> Eugene H. Blackstone, MD,<sup>a,b</sup> and Lee C. Swanson, MD, PhD<sup>a</sup>

#### ABSTRACT

**Objective:** The study objective was to report the safety and clinical outcomes of robotically assisted mitral valve repair in 1000 cases performed in a tertiary care center.

**Methods:** We reviewed the first 1000 cases of robotically assisted mitral valve repair (n = 185), from January 2006 to February 2017. The majority (n = 960, 96%, n = 10, 1.0%), ischemic (n = 3, 0.3%) were performed via right thoracotomy bypass.

**Results:** Mitral valve repair was attempted in 1000 patients and 1 resection of fibroelastosis was performed. The overall repair rate was 99.4%, and 5 (0.5%) of whom underwent repeat echocardiography showed that 99.2% (992) left the operating room with no residual mitral regurgitation. Echocardiography showed that mitral regurgitation was present in 97.9% of patients (915/935). There were 1.4% experienced a stroke; stroke rate was 0.8% in the second 500 patients. Complications included 0.8% in the second 500 patients. Complications included 0.8% in the second 500 patients.

**Conclusions:** Robotic mitral valve repair and low operative mortality and intensive care unit and postoperative 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<sup>a</sup>

Didier F. Loumet<sup>a</sup>, Neel K. Ranganath<sup>a</sup>, Peter J. Neuberger<sup>b</sup>, Robert G. Nampiaparampil<sup>b</sup>, Aubrey C. Galloway<sup>a</sup> and Eugene A. Grossi<sup>a\*</sup>

<sup>a</sup> Department of Cardiothoracic Surgery, Division of Cardiac Surgery, NYU Langone Health, New York, NY, USA

<sup>b</sup> 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 analyzed 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

Loumet D et al: *Eur J Cardiothor Surg* 2019;56:470-8

# Robotická plastika MCH



## Recentní evidence (MICS + RCS)

Propensity-matched analysis of minimally invasive approach versus sternotomy for mitral valve surgery

Stuart W  
Joseph Za

**Minimally invasive mitral valve surgery versus conventional sternotomy mitral valve surgery: A systematic review and meta-analysis of 119 studies**

Adam J. Eqbal MD BHSc<sup>1</sup>  
Ameen Basha MD BHSc<sup>2</sup>  
Fan Victor Chu MD FRCS  
Richard P. Whitlock MD P

**A Systematic Review and Meta-Analysis of Robot-Assisted Mitral Valve Repair**

Ali Fatehi Hass  
Ameen M. Bas  
William D. T. M  
Tania Stafinski

Innovations  
2022, Vol. 17(6) 471-481  
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**Robotic versus conventional sternotomy mitral valve surgery: a systematic review and meta-analysis**

Michael L. Williams<sup>1</sup>  
Aditya Eranki<sup>6</sup>, Trista

**Systematic review and meta-analysis of mid-term survival, reoperation, and recurrent mitral regurgitation for robotic-assisted mitral valve repair**

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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

# Robotická plastika MCH



## Recentní evidence (MICS + RCS)

- **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**

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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# Robotická plastika MCH



## Recentní evidence

### Robotic Mitral Valve Repair for Degenerative Mitral Regurgitation

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#### 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;■:■-■)

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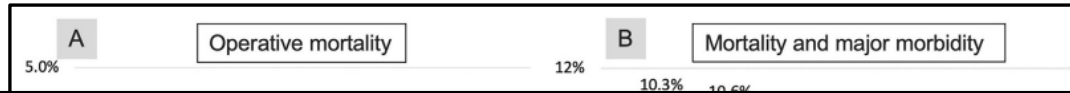
- STS Adult Cardiac Surgical Database 2015 - 2021
- 63,122 pacientů s plastikou MCH pro primární MR
  - 7692 Robotických plastik MCH
  - 15,725 Plastik MCH z torakotomie
  - 39,705 Plastik MCH ze sternotomie
- „Propensity score matching“
  - Robotika vs. torakotomie - 5540 patients
  - Robotika vs. sternotomie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

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

# Robotická plastika MCH



## 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 ( $p < 0.001$ )

— Sternotomy — Thoracotomy — Robotic

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

# Závěry



- Indikace k zachovným operacím mitrálních chlopní se posouvají čím dál tím více k asymptomatickým pacientům bez dilatace LK
- Robotická chirurgie mitrální chlopně je standardizovaná chirurgické metody s reprodukovatelnými a predikovatelnými velmi dobrými výsledky
- Pokroky především v zobrazovací a robotické technologii, ale i pokroky v operační technice, umožňují rozšířit spektrum prováděných minimálně invazivních výkonů na mitrální chlopni
- Krátce i dlouhodobé výsledky jsou srovnatelné s výsledky zachovných operací mitrální chlopně ze střední sternotomie s neporovnatelně lepším kosmetickým efektem a větší akceptací pacienty
- Recentní evidence ukazuje, že robotický přístup k mitrální chlopni zaručuje nejlepší reparabilitu MCH
- Robotický přístup má potenciál stát se standardem léčby primární mitrální regurgitace u nízkorizikových asymptomatických nemocných indikovaných na základě recentních guidelines

**Děkuji za pozornost !!!!**