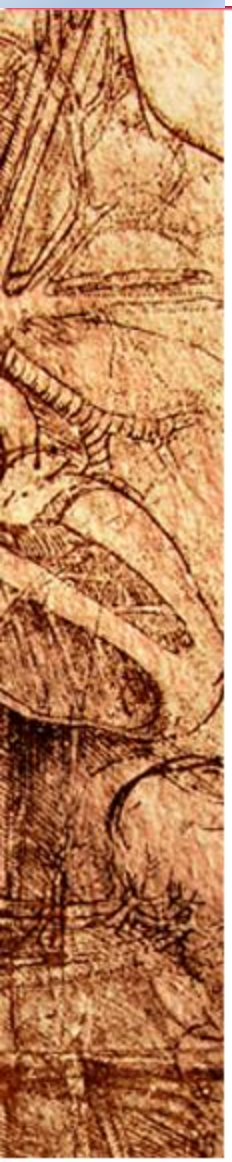
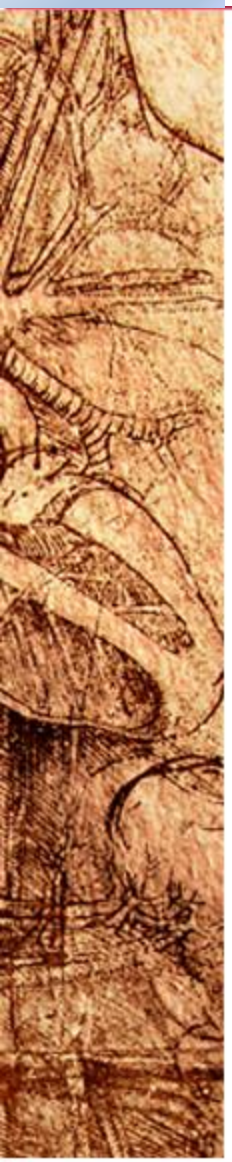


ROBOTICKÁ ZÁCHOVNÁ OPERACE MITRÁLNÍ CHLOPNĚ – Cesta k plně endoskopické kardiochirurgii

Černý Š., Skalský I., Michel M., Klváček A., Večeřová A., Bohuslávek J., Henych R.

Kardiochirurgické oddělení
Nemocnice Na Homolce
Praha

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ



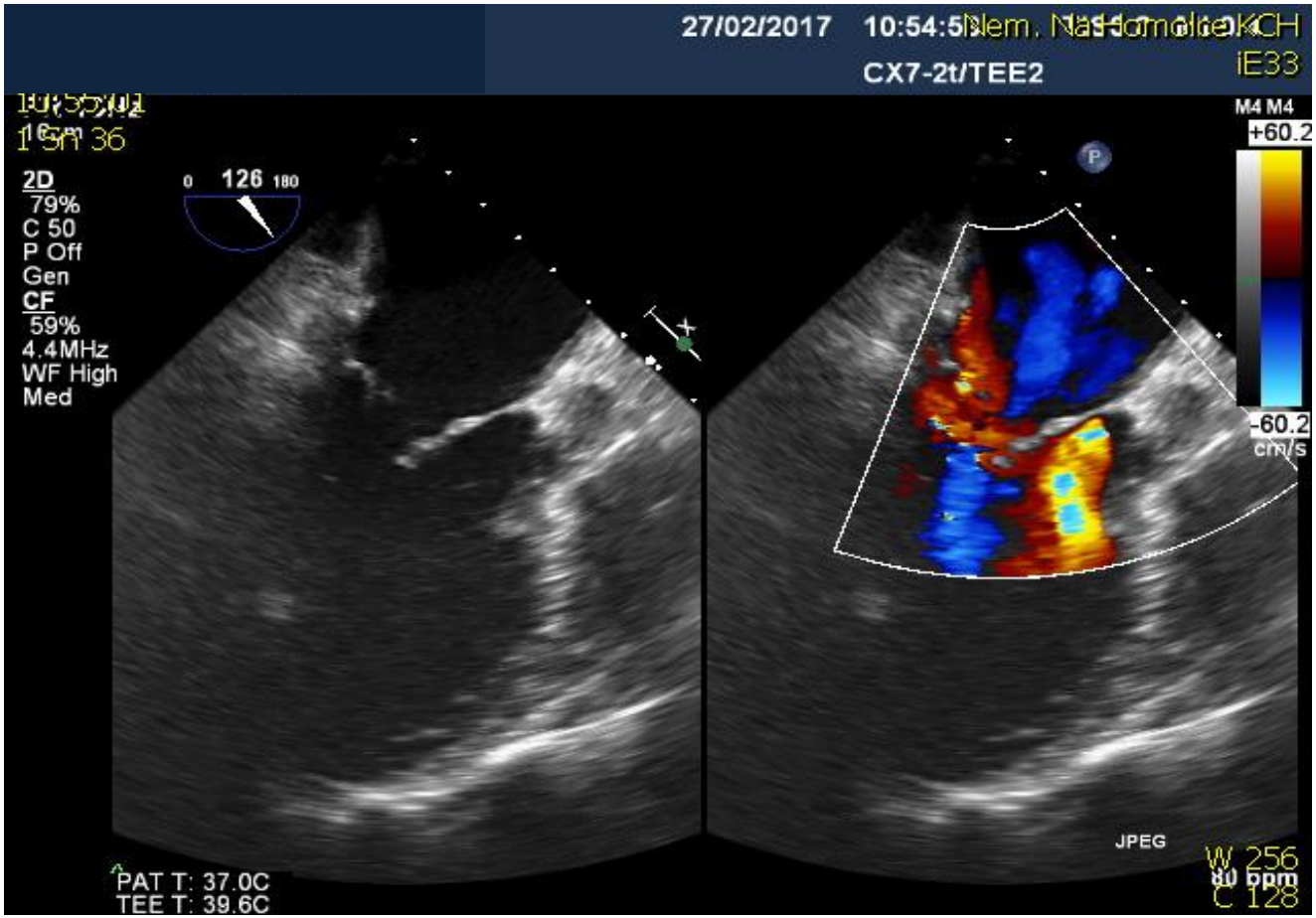
KONFLIKT ZÁJMŮ

- **Intuitive Surgical**
  - **Proktoring**

- **Heart Repair Technologies**
  - **Proktoring a přednášková činnost,**
  - **Principal Investigator klinické studie (Post Market Mitral Bridge Clinical Study)**

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

PRIMÁRNÍ MITRÁLNÍ REGURGITACE



ERO ≥ 0,4 cm² **RV ≥ 60mL**

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Velmi nízká mortalita u izolované plastiky mitrální chlopně

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 (1% vs 2[illegible]) and atrial fibrillation (9.9% vs 23%). Full sinus rhythm increased from era 1 (n = 1,100/93%) to era 2 (n = 602/[illegible]%) to era 3 (n = 717/31%), and robotic surgery emerged (n = 57/25%) 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.

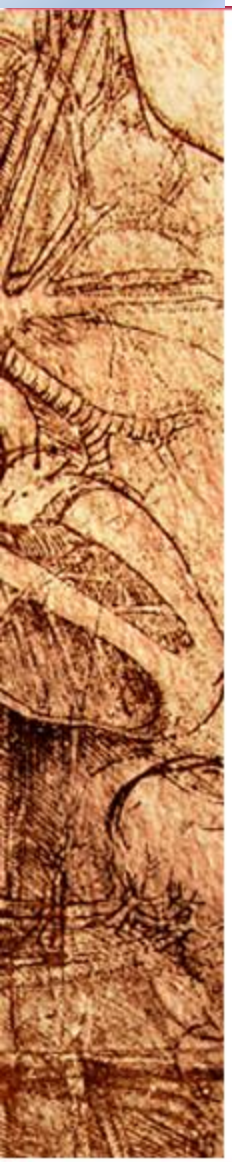
Conclusions. Treatment trends over 25 years reveal that rather than watchful waiting, a more aggressive approach to degenerative MV disease, with earlier intervention for severe regurgitation in asymptomatic patients and less invasive operative techniques, is successful, safe, and effective.

(Ann Thorac Surg 2015;■:■–■)

0,18%

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

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ



Reparabilita mitrální chlopně 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 200[illegible] 2010, [illegible] consecutive patients (mean age, 58 ± 13 years [range, 12-90]; mean LVEF, 55% ± [illegible]% with degenerative mitral valve regurgitation and prolapse (anterior leaflet: n = 42, 6%; posterior leaflet: n = [illegible]56, 75%; bileaflet: n = 146, 19%) underwent mitral valve surgery. Annular, leaflet or chordal calcification was present in 2[illegible]% 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.

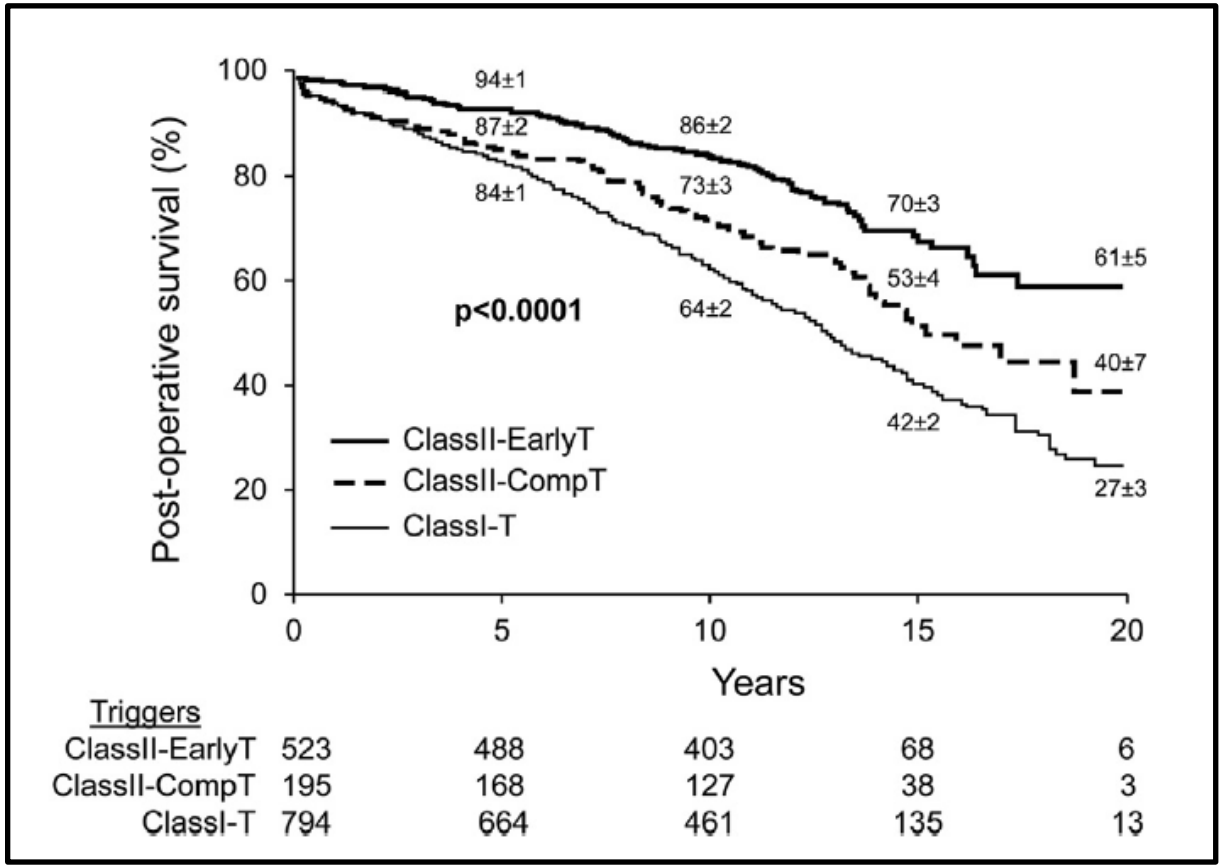
Conclusions: A systematic strategy of mitral valve repair that uses a variety of techniques allows repair of all degenerative valves in a reference center, with good short-term outcomes and mid-term durability. Further study is required to document the long-term efficacy of an "all comers" mitral valve 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

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Plastika mitrální chlopně – Class I trigery vs. Class II trigery



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

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

European Journal of Cardio-Thoracic Surgery 52 (2017) 616–664
doi:10.1093/ejcts/ezx324 Advance Access publication 26 August 2017

2017 ESC/EACTS Guidelines for the management of valvular heart disease

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)

Changes in recommendations

2012	2017
Indications for intervention in asymptomatic severe primary mitral regurgitation	
IIb C Surgery may be considered in asymptomatic patients with preserved LV function, high likelihood of durable repair, low surgical risk, and: • Left atrial dilatation (volume index ≥60 mL/m² BSA) and sinus rhythm	**IIa C (modified!)** Surgery should be considered in asymptomatic patients with preserved LVEF (>60%) and LVESD 40–44 mm when a durable repair is likely, surgical risk is low, the repair is performed in heart valve centres, and the following finding is present: presence of significant LA dilatation (volume index ≥60 mL/m² BSA) in sinus rhythm

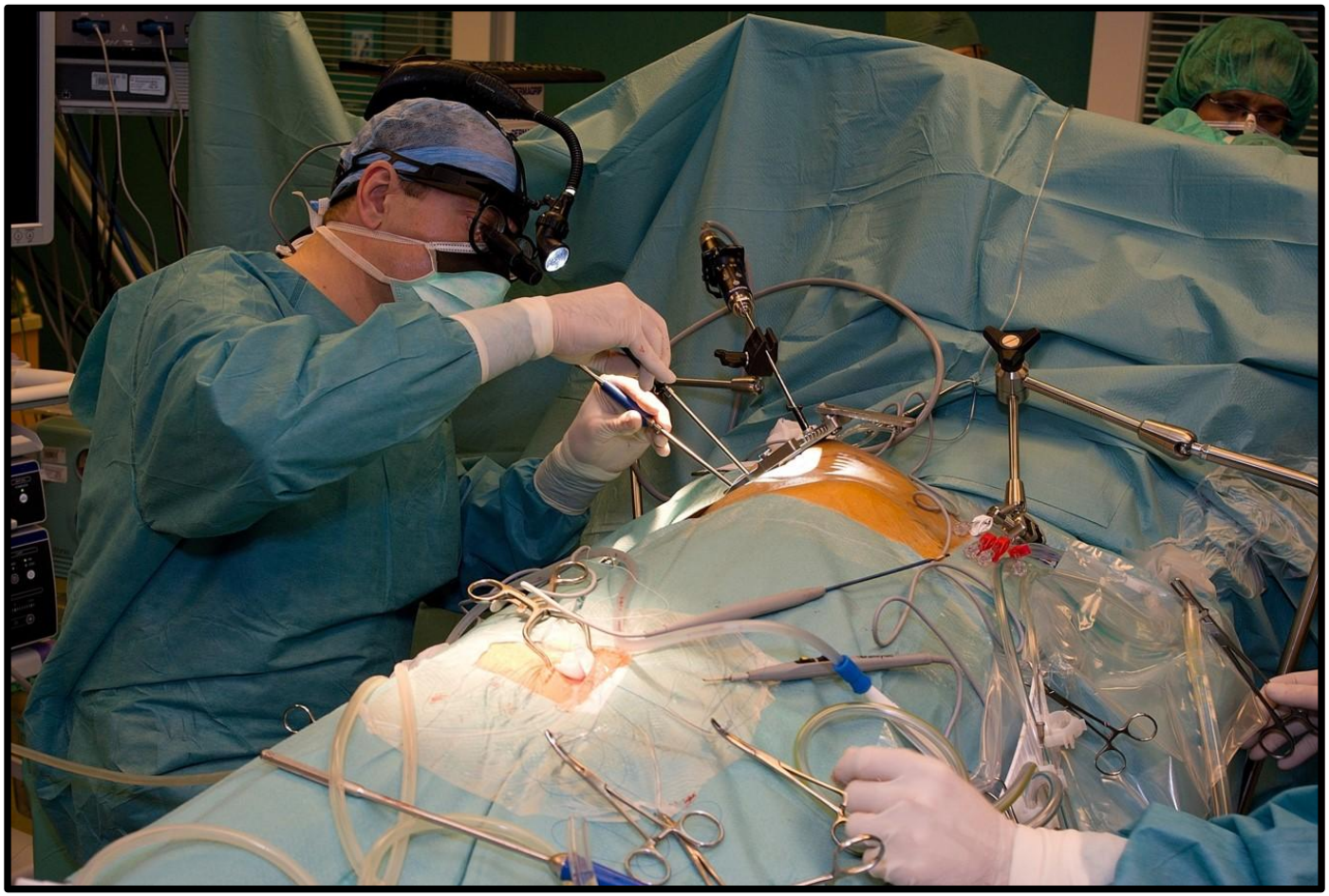
Falk V et al: *Eur J Cardiothor Surg 2017*;52:616-664

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Střední sternotomie

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Minimálně invazivní plastika mitrální chlopně

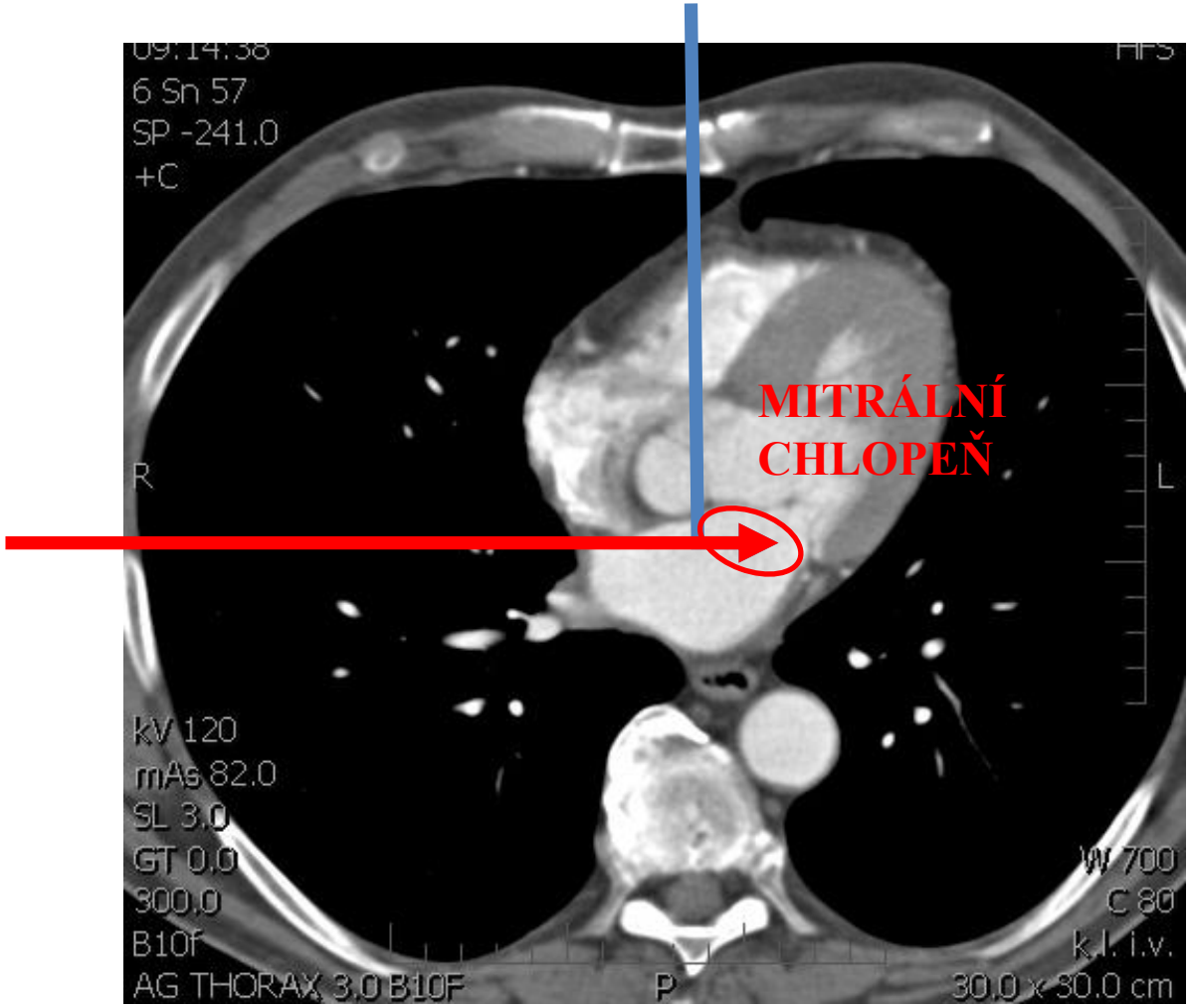


ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Minimálně invazivní plastika mitrální chlopně

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Minimálně invazivní plastika mitrální chlopně



ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

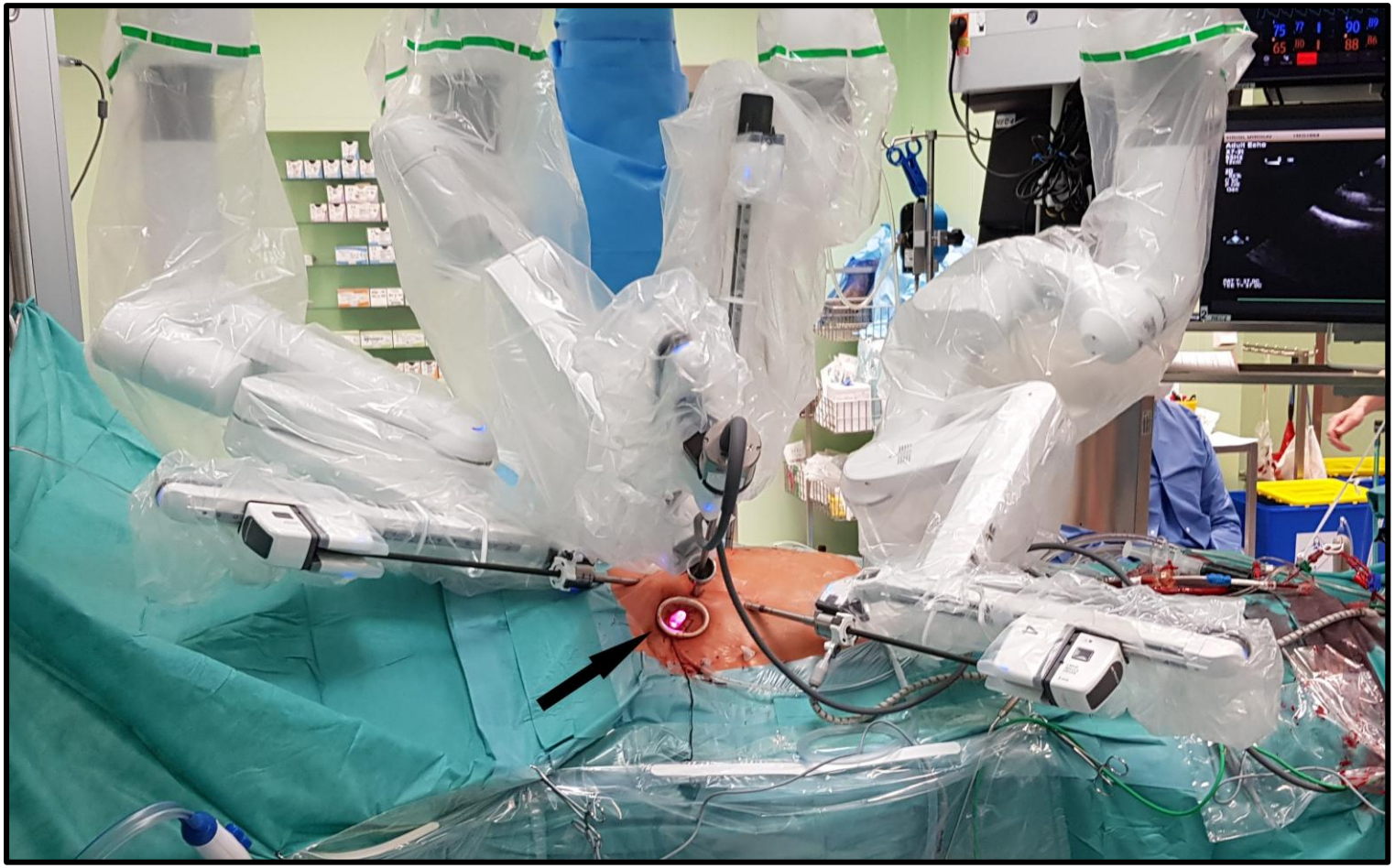
Robotika = telemanipulace

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Robotika = telemanipulace

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Robotická plastika mitrální chlopně

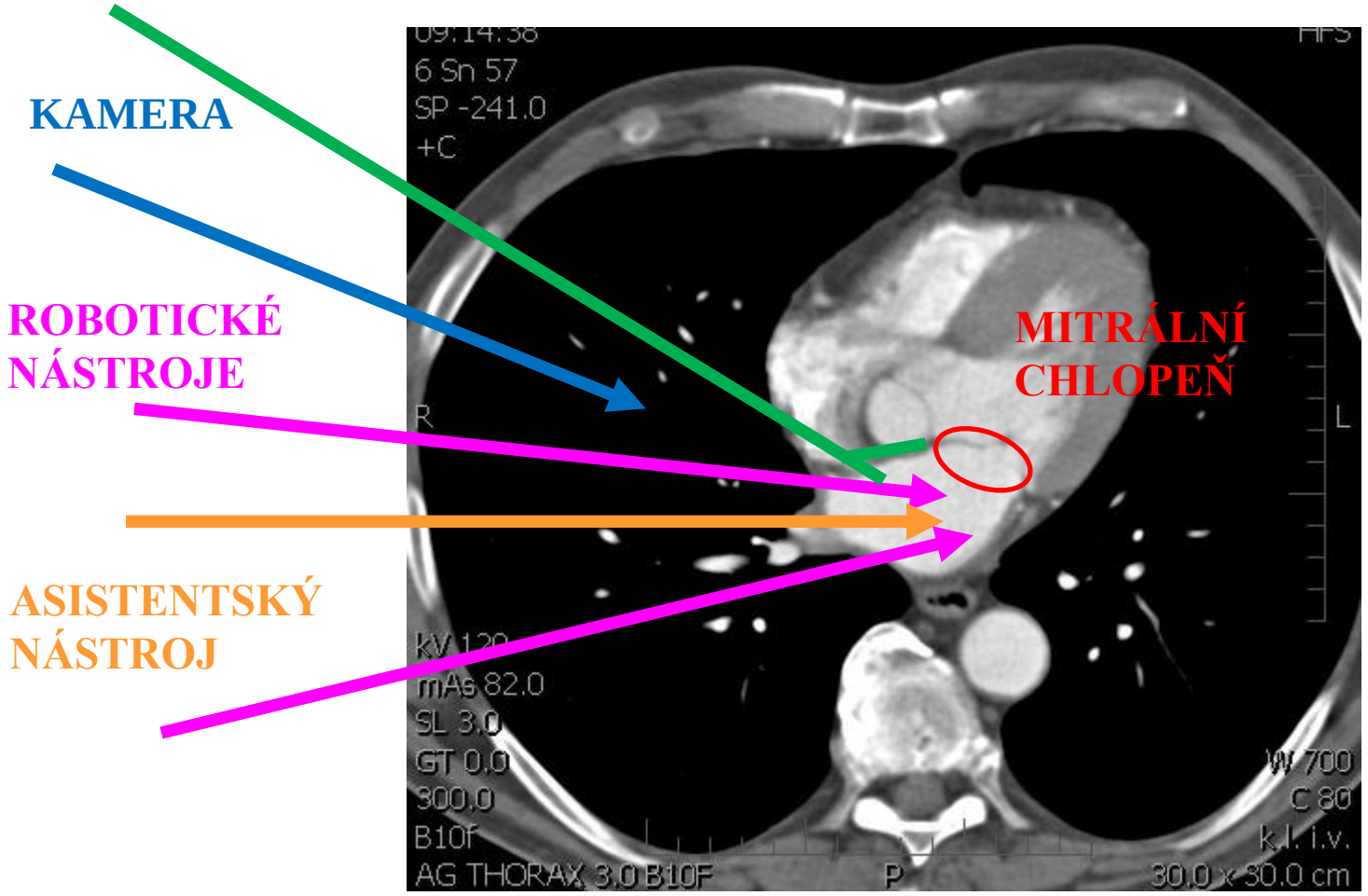


ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Robotická plastika mitrální chlopně

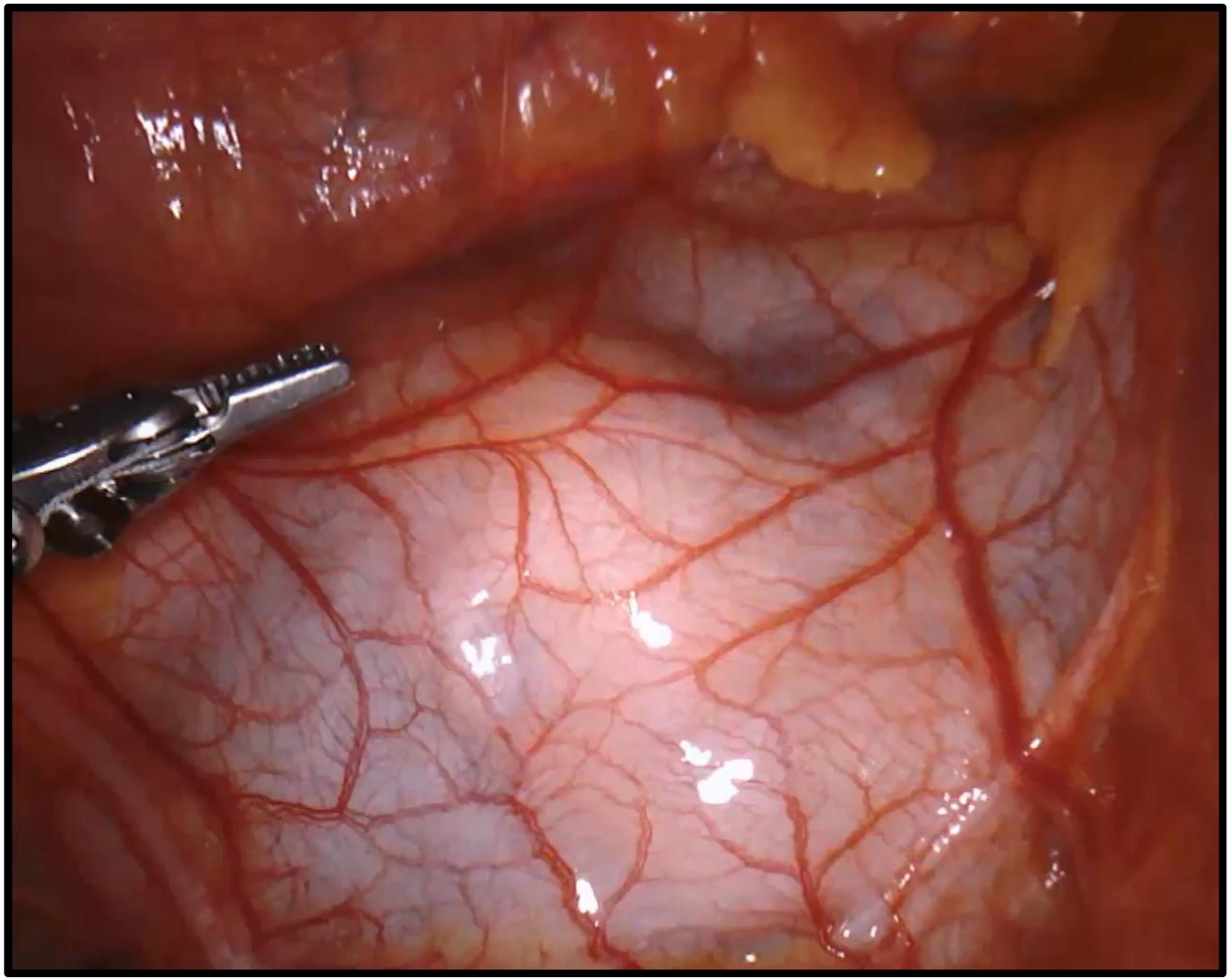
ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Robotická plastika mitrální chlopně



ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

PLASTIKA MITRÁLNÍ CHLOPNĚ



ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Robotická plastika mitrální chlopně

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

A. Marc Gillinov, MD,[a] Tomislav Mihaljevic, MD,[a] Hod
Rakesh M. Suri, MD, DPhil,[a] Stephanie L. Mick, MD,[a]
Johannes Bonatti, MD,[a] Mitra Khosravi, BS,[a] Jay J. Idre
Eugene H. Blackstone, MD,[a,c] and Lars G. Svensson, M

ABSTRACT

Objective: The study objective was to assess the technical and
ment and clinical outcomes of robotic mitral valve surgery by
1000 cases performed in a tertiary care center.

Methods: We reviewed the first 1000 patients (mean age, 56 ±
going robotic primary mitral valve surgery, including concor
(n = 185), from January 2006 to November 2013. Mitral va
was degenerative (n = 960, 96%), endocarditis (n = 26,
(n = 10, 1.0%), ischemic (n = 3, 0.3%), and fibroelastoma (
procedures were performed via right chest access with femoral
diopulmonary bypass.

Results: Mitral valve repair was attempted in 997 patients (2
ments and 1 resection of fibroelastoma), 992 (99.5%) of whom
repair, and 5 (0.5%) of whom underwent valve replacement. In
repair echocardiography showed that 99.7% of patients rece
992) left the operating room with no or mild mitral regurgitation
echocardiography showed that mitral regurgitation remained
97.9% of patients (915/935). There was 1 hospital death (0.1%
(1.4%) experienced a stroke; stroke risk declined from 2% in th
to 0.8% in the second 500 patients. Over the course of the exper
ischemic and cardiopulmonary bypass times ($P < .0001$), trans
and intensive care unit and postoperative lengths of stay ($P <$

Conclusions: Robotic mitral valve surgery is associated with a
valve repair and low operative mortality and morbidity. Th
algorithm-driven patient selection and increased experience
outcomes and procedural efficiency. (J Thorac Cardiovasc Surg 2017;■:1-10)

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. Macheers, MD, Eric L. Sarin, MD, Alexander M. Herzog, BS, Vinod H. Thourani, MD, Robert A. Guyton, MD, and Michael E. Halkos, MD, MS

Division of Cardiothoracic Surgery, Emory University School of Medicine, and Rollins School of Public Health, Emory University, Atlanta, Georgia

Background. The role of robotic instruments in mitral valve (MV) surgery continues to evolve. The purpose of this study was to assess the safety, efficacy, and scope of MV surgery using a lateral endoscopic approach with robotics (LEAR) technique.

Methods. From 2006 to 2013, a dedicated LEAR team performed 1,257 consecutive isolated MV procedures with or without tricuspid valve repair or atrial ablation. The procedures were performed robotically through five right-side chest ports with femoral artery or ascending aortic perfusion and balloon occlusion. Operative videos and data were recorded on all procedures and reviewed retrospectively.

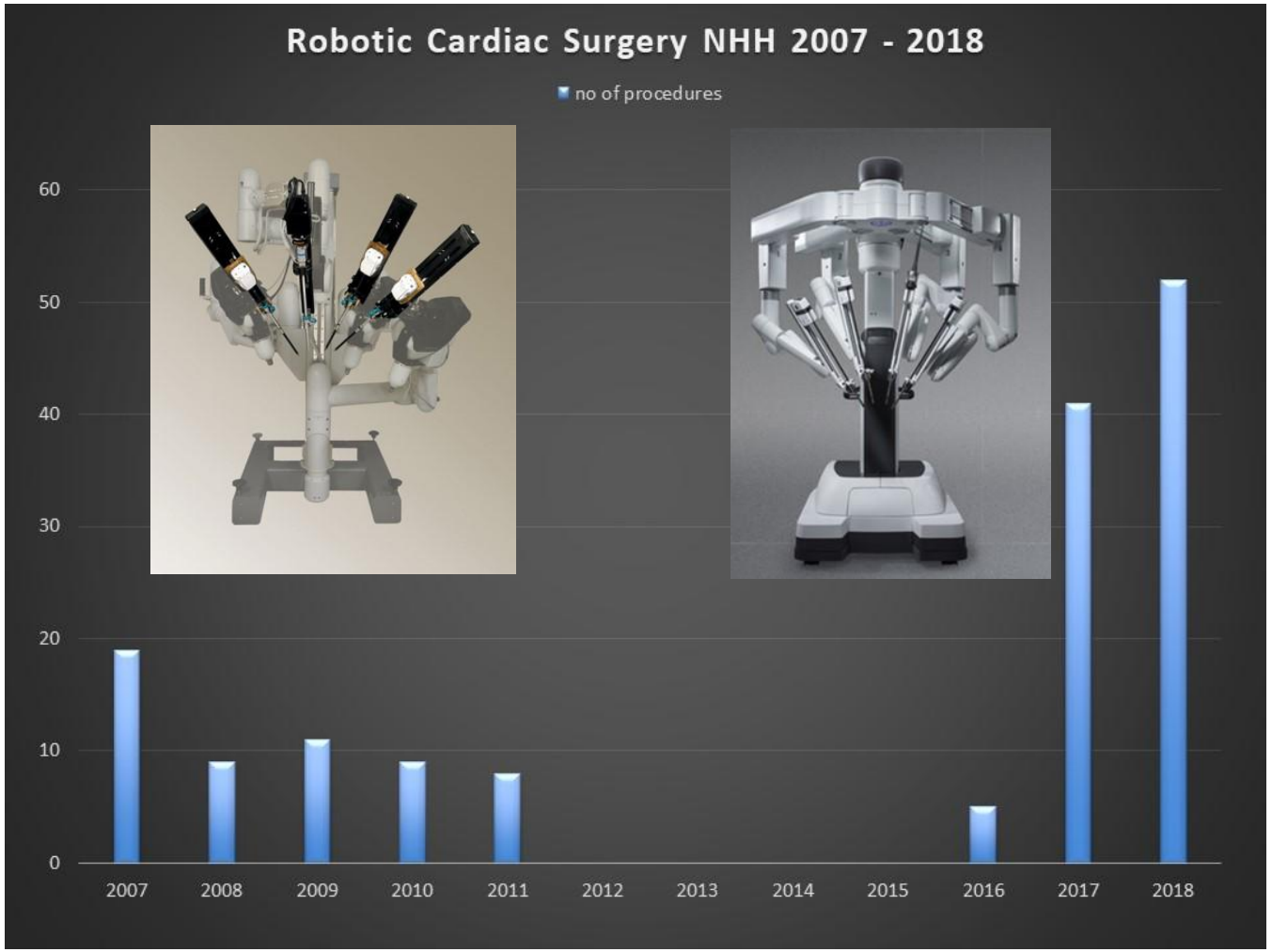
Results. The mean age of all patients was 59.3 ± 20.5 years, and 8.4% (n = 105) had previous cardiac surgery. The MV repair was performed in 1,167 patients (93%). The MV replacement was performed in 88 patients (7%), and paravalvular leak repair in 2 patients. Concomitant atrial ablation was performed in 226 patients (18%), and tricuspid valve repair in 138 patients (11%). Operative mortality occurred in 11 patients (0.9%) and stroke in 9 patients (0.7%). Predischarge echocardiograms demonstrated mild or less mitral regurgitation in 98.3% of MV repair patients. At mean follow-up of 50 ± 26 months, 44 patients (3.8%) required MV reoperation. Application of the LEAR technique to all institutional isolated MV procedures increased from 46% in the first year to more than 90% in the last 3 years.

Conclusions. Mitral valve repair or replacement, including concomitant procedures, can be performed safely and effectively using the LEAR technique. With a dedicated robotic team, the vast majority of patients with MV disorders, either isolated or with concomitant problems, can be treated using the LEAR technique.

(Ann Thorac Surg 2015;100:1675–82)

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

ROBOTICKÁ KARDIOCHIRURGIE NNH 2007 - 2018



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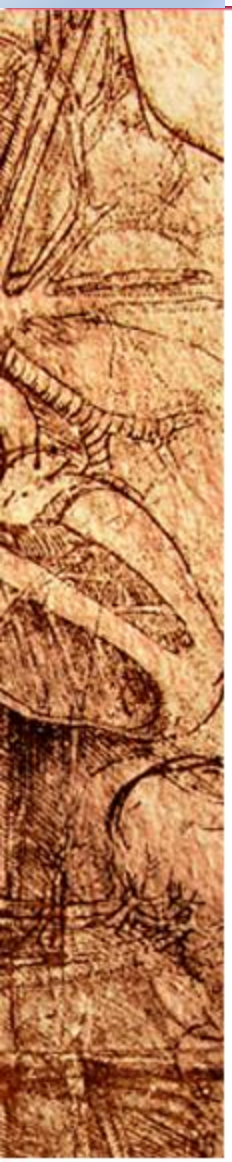
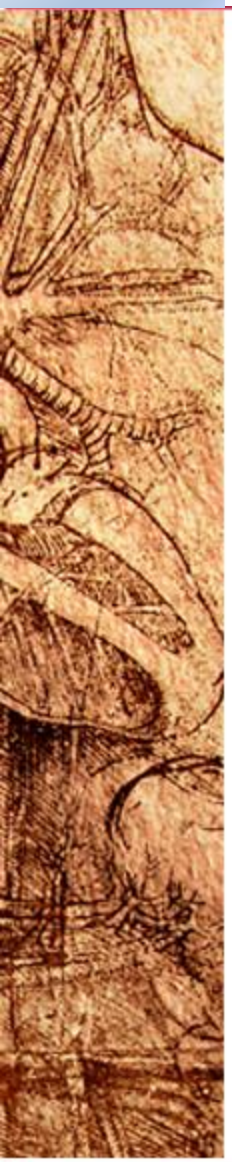


ROBOTICKÁ CHIRURGIE MCH NNH 2017 - 2019

Demografická data	
Počet pacientů (n)	32
Ženské pohlaví (n)	11 (34,3 %)
Věk (roky)	52,4±14,1 (31 – 75)
Trikuspidální regurgitace ≥ 3 st. (n)	0 (0 %)
Fibrilace síní (n)	3 (9,4 %)
ICHS (n)	0 (0 %)
NYHA (stupeň)	1,56±0,56 (1-3)

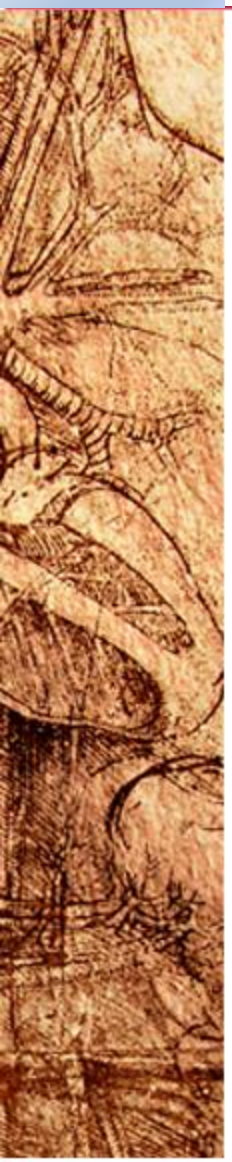
ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ



ROBOTICKÁ CHIRURGIE MCH NNH 2017 - 2019

Předoperační TTE data	
LVEF (%)	66,1 ± 4,87 (55 -75)
LVEDD (mm)	56, 0± 7,09 (50 – 72)
LVESD (mm)	32,6 ± 7,19 (25 – 46)
Stupeň MR	3,94 ± 0,25
ERO (cm^2)	0,53 ± 0,16
RV (ml)	83,17 ± 25,2
AP rozměr anulu MCH (mm)	40,0 ± 5,48

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

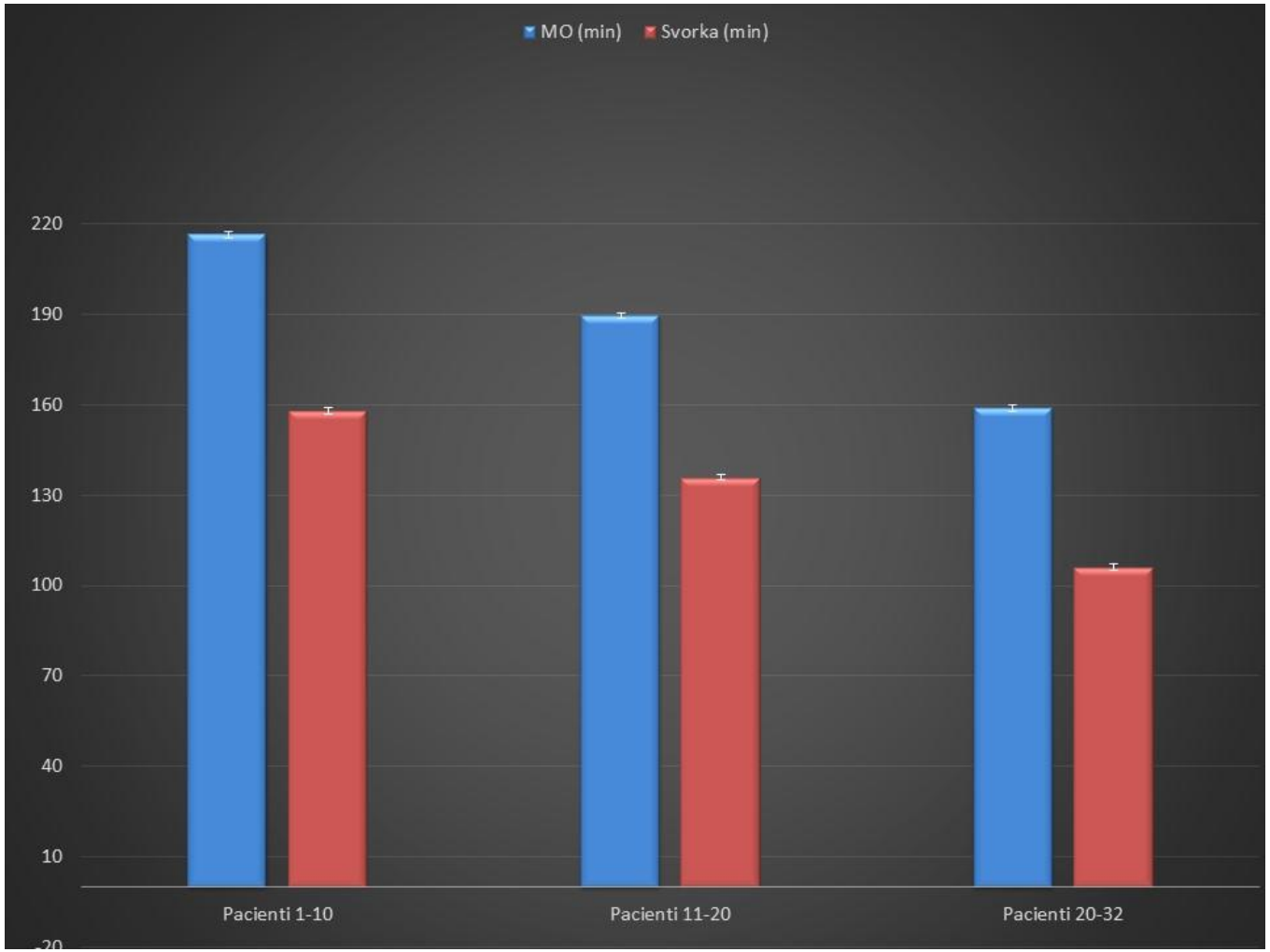


ROBOTICKÁ CHIRURGIE MCH NNH 2017 - 2019

Peroperační data	
MO (min)	186,4± 35,6
Svorka (min)	131,7± 29,1
Endoclamp (n)	31 (96.8 %)
Konverze – minitorakotomie (n)	1 (3,1 %)
Konverze – sternotomie (n)	0 (0 %)
Revize pro krvácení (n)	0 (0 %)
Mortalita (30d) (n)	0 (0 %)

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

DÉLKA MO A SVORKY - VŠICHNI PACIENTI

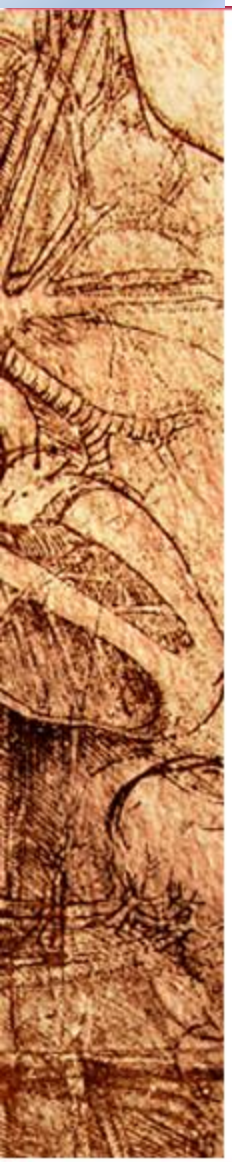


ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

ROBOTICKÁ CHIRURGIE MCH NNH 2017 - 2019

Plastika mitrální chlopně	
Plastika chlopně (n)	32 (100 %)
Implantace ringu (n)	32 (100 %)
Izolovaný ring (n)	7 (21,9%)
Velikost ringu (velikost)	34,7± 3,4 (28-40)
Triangulární resekce (n)	17 (53,1 %)
Arteficiální neochordy (n)	7 (21,9 %)
Přenos chord (n)	3 (9,4 %)
Jiné (n)	3 (9,4 %)
MAZE (n)	3 (9,4 %)

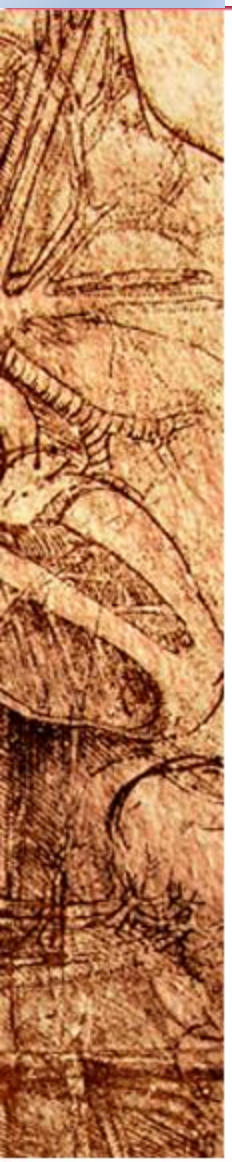
ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ



ROBOTICKÁ CHIRURGIE MCH NNH 2017 - 2019

Výsledky – Sledování	
Sledování (měsíce)	10,4 ± 7,7 (1-23)
Stupeň MR při posledním TTE	0,25 ± 0,26
Pozdní mortalita	0 (0%)
Reintervence na MCH	0 (0%)

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ



ZÁVĚRY

- **Robotická chirurgie mitrální chlopně je standardizovaná chirurgická metoda s reprodukovatelnými a predikovatelnými výsledky**
- **Pokroky v technologii umožňují rozšířit spektrum prováděných minimálně invazivních výkonů na mitrální chlopni**
- **Metoda je zatížena podstatnou „learning curve“**
- **Metoda má potenciál stát se standardem léčby primární mitrální regurgitace**

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

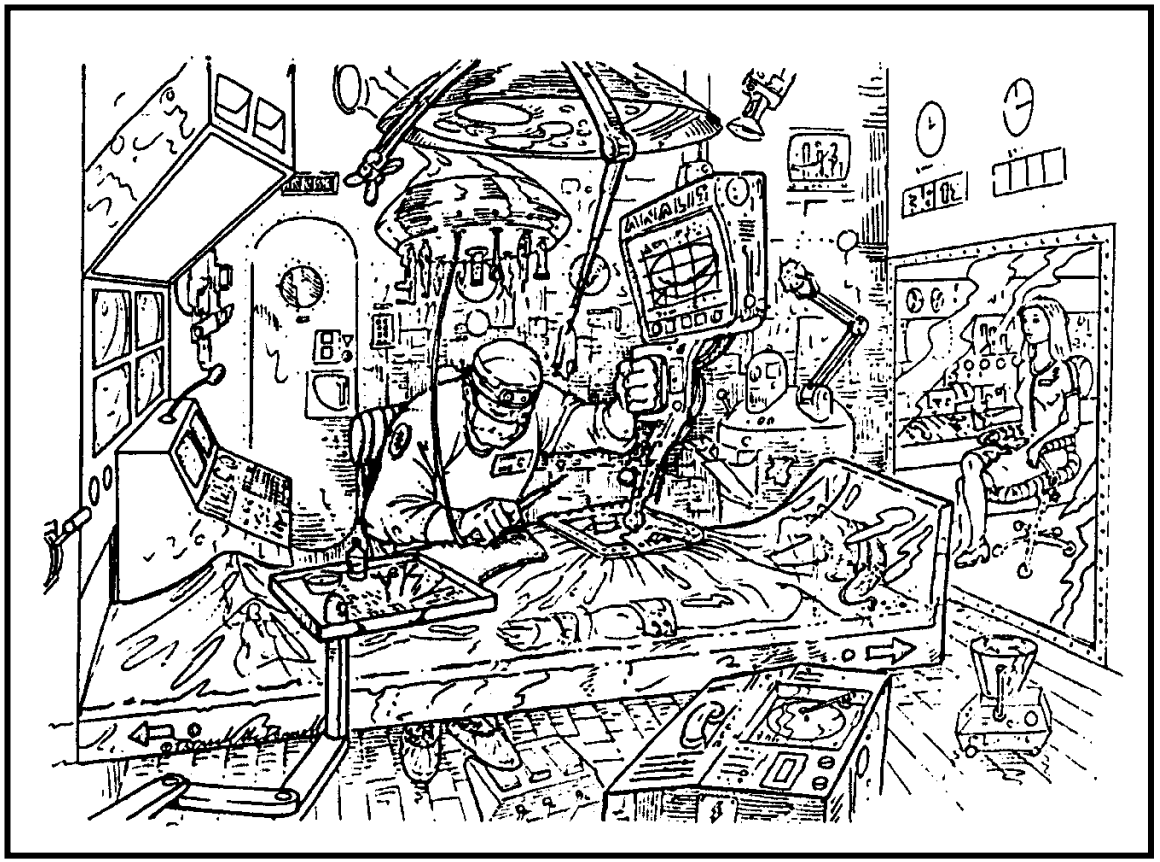
„The only thing we know about the future is that it will be different…“

Peter Drucker (1909-2005)

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

„The best way to predict the future is to invent it…“

Alan Curtis Kay (1940-)



Carpentier A, J Thorac Cardiovasc Surg 1983;86:323-337

ROBOTICKÁ CHIRURGIE MITRÁLNÍ CHLOPNĚ

Děkuji za pozornost!