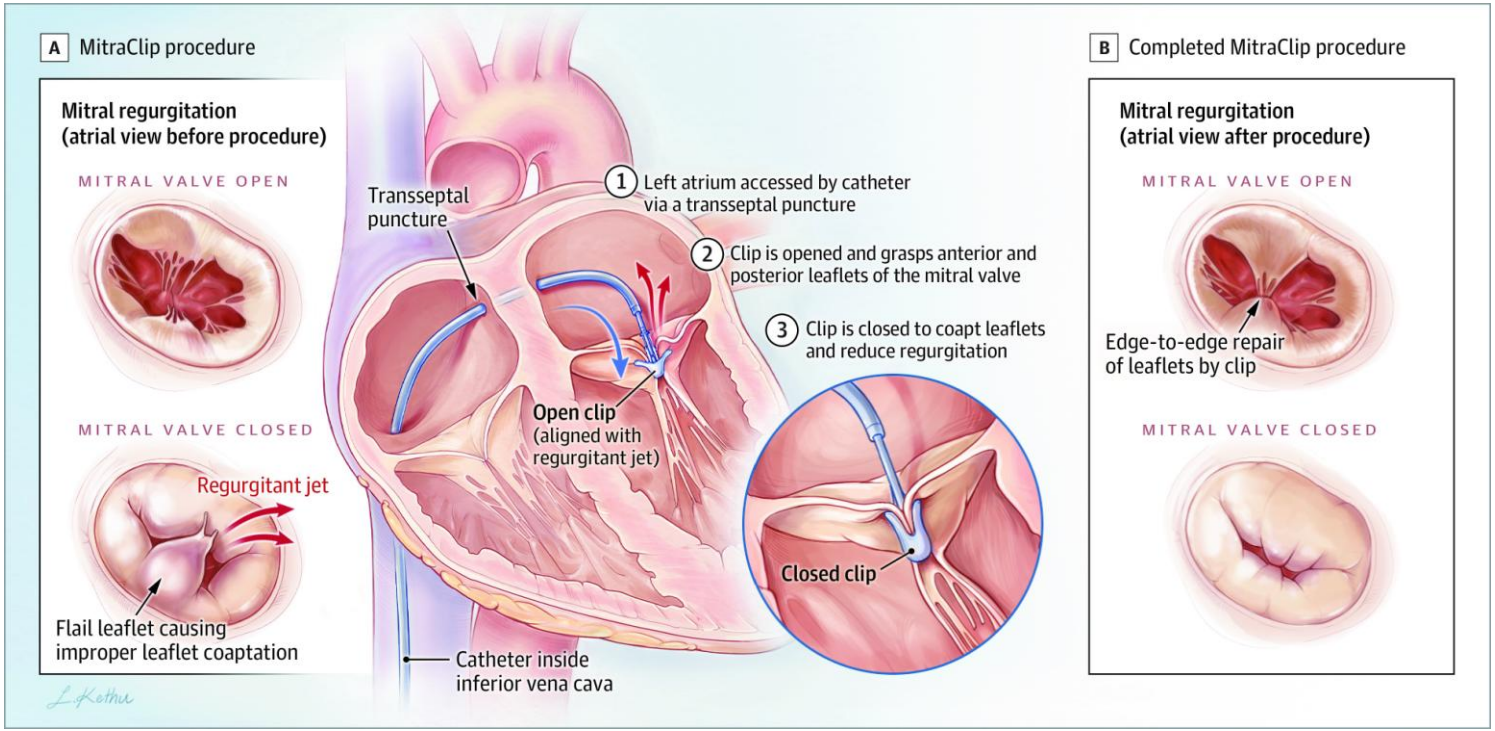
TEER A PRIMÁRNÍ MITRÁLNÍ REGURGITACE POHLEDEM KARDIOCHIRURGA

Štěpán ČERNÝ
Klinika kardiovaskulární chirurgie
FN Motol, Praha

XXXIII. VÝROČNÍ SJEZD ČESKÉ KARDIOLOGICKÉ SPOLEČNOSTI, 3.-6. Května 2025, Brno

TEER a primární MR

TEER a primární mitrální regurgitace



Makar RJ et al: JAMA 2023;329(20):1778-1788

TEER a primární MR

Guidelines – ESC/EACTS 2021 & ACC/AHA 2020

Recommendations on indications for intervention in severe primary mitral regurgitation

Recommendations	Class[a]	Level[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

Recommendations for Intervention for Chronic Primary MR
Referenced studies that support the recommendations are summarized in Online Data Supplement 30.

COR	LOE	Recommendations
2a	B-NR	In severely symptomatic patients (NYHA class III or IV) with primary severe MR and high or prohibitive surgical risk, transcatheter edge-to-edge repair (TEER) is reasonable if mitral valve anatomy is favorable for the repair procedure and patient life expectancy is at least 1 year.[17,18]

Vahanian A et al: Eur Heart J 2022;43(7):561-632

Otto CM, Nishimura RA et al: Circulation 2021;143 (5):e35-e71

TEER a primární MR

Everest II trial

73% primární MR

Percutaneous Repair or Surgery for Mitral Regurgitation

ABSTRACT

BACKGROUND

Mitral-valve repair can be accomplished with an investigational procedure that involves the percutaneous implantation of a clip that grasps and approximates the edges of the mitral leaflets at the origin of the regurgitant jet.

METHODS

We randomly assigned 279 patients with moderately severe or severe (grade 3+ or 4+) mitral regurgitation in a 2:1 ratio to undergo either percutaneous repair or conventional surgery for repair or replacement of the mitral valve. The primary composite end point for efficacy was freedom from death, from surgery for mitral-valve dysfunction, and from grade 3+ or 4+ mitral regurgitation at 12 months. The primary safety end point was a composite of major adverse events within 30 days.

RESULTS

At 12 months, the rates of the primary end point for efficacy were 55% in the percutaneous-repair group and 73% in the surgery group (P=0.007). The respective rates of the components of the primary end point were as follows: death, 6% in each group; surgery for mitral-valve dysfunction, 20% versus 2%; and grade 3+ or 4+ mitral regurgitation, 21% versus 20%. Major adverse events occurred in 15% of patients in the percutaneous-repair group and 48% of patients in the surgery group at 30 days (P<0.001). At 12 months, both groups had improved left ventricular size, New York Heart Association functional class, and quality-of-life measures, as compared with baseline.

CONCLUSIONS

Although percutaneous repair was less effective at reducing mitral regurgitation than conventional surgery, the procedure was associated with superior safety and similar improvements in clinical outcomes. (Funded by Abbott Vascular; EVEREST II ClinicalTrials.gov number, NCT00209274.)

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*Additional investigators in the Endovascular Valve Edge-to-Edge Repair Study (EVEREST) II are listed in the Supplementary Appendix, available at NEJM.org.

This article (10.1056/NEJMoa1009355) was published on April 4, 2011, and updated on July 13, 2011, at NEJM.org.

N Engl J Med 2011;364:1395-406.

Feldman T et al: N Engl J Med 2011;364:1395-406

TEER a primární MR

Everest II trial

Table 2. Primary Efficacy End Point at 12 Months and Major Adverse Events at 30 Days in the Intention-to-Treat Population.*

Event	Percutaneous Repair	Surgery	P Value
	no. (%)		
Primary efficacy end point			
Freedom from death, from surgery for mitral-valve dysfunction, and from grade 3+ or 4+ mitral regurgitation†	100 (55)	65 (73)	0.007
Death	11 (6)	5 (6)	1.00
Surgery for mitral-valve dysfunction‡	37 (20)	2 (2)	<0.001
Grade 3+ or 4+ mitral regurgitation	38 (21)	18 (20)	1.00
Major adverse event at 30 days§			
Any major adverse event	27 (15)	45 (48)	<0.001¶
Any major adverse event excluding transfusion	9 (5)	9 (10)	0.23
Death	2 (1)	2 (2)	0.89
Myocardial infarction	0	0	NA
Reoperation for failed surgical repair or replacement	0	1 (1)	0.74
Urgent or emergency cardiovascular surgery for adverse event	4 (2)	4 (4)	0.57
Major stroke	2 (1)	2 (2)	0.89
Renal failure	1 (<1)	0	1.00
Deep wound infection	0	0	NA
Mechanical ventilation for >48 hr	0	4 (4)	0.02
Gastrointestinal complication requiring surgery	2 (1)	0	0.78
New onset of permanent atrial fibrillation	2 (1)	0	0.78
Septicemia	0	0	NA
Transfusion of ≥2 units of blood	24 (13)	42 (45)	<0.001

Feldman T et al: N Engl J Med 2011;364:1395-406

TEER a primární MR

Everest II trial

Randomized Comparison of Percutaneous Repair and Surgery for Mitral Regurgitation

5-Year Results of EVEREST II

ABSTRACT

BACKGROUND In EVEREST II (Endovascular Valve Edge-to-Edge Repair Study), treatment of mitral regurgitation (MR) with a novel percutaneous device showed superior safety compared with surgery, but less effective reduction in MR at 1 year.

OBJECTIVES This study sought to evaluate the final 5-year clinical outcomes and durability of percutaneous mitral valve (MV) repair with the MitraClip device compared with conventional MV surgery.

METHODS Patients with grade 3+ or 4+ MR were randomly assigned to percutaneous repair with the device or conventional MV surgery in a 2:1 ratio (178:80). Patients prospectively consented to 5 years of follow-up.

RESULTS At 5 years, the rate of the composite endpoint of freedom from death, surgery, or 3+ or 4+ MR in the as-treated population was 44.2% versus 64.3% in the percutaneous repair and surgical groups, respectively ($p = 0.01$). The difference was driven by increased rates of 3+ to 4+ MR (12.3% vs. 1.8%; $p = 0.02$) and surgery (27.9% vs. 8.9%; $p = 0.003$) with percutaneous repair. After percutaneous repair, 78% of surgeries occurred within the first 6 months. Beyond 6 months, rates of surgery and moderate-to-severe MR were comparable between groups. Five-year mortality rates were 20.8% and 26.8% ($p = 0.4$) for percutaneous repair and surgery, respectively. In multivariable analysis, treatment strategy was not associated with survival.

CONCLUSIONS Patients treated with percutaneous repair more commonly required surgery for residual MR during the first year after treatment, but between 1- and 5-year follow-up, comparably low rates of surgery for MV dysfunction with either percutaneous or surgical therapy endorse the durability of MR reduction with both repair techniques. (EVEREST II Pivotal Study High Risk Registry; NCT00209274) (J Am Coll Cardiol 2015;66:2844–54) © 2015 by the American College of Cardiology Foundation.

Feldman T et al: J Am Coll Cardiol 2015;66:2844-54

TEER a primární MR

Everest II trial

TABLE 2 All-Treated Cohort: Efficacy Endpoint and Components at 5 Years*

	5 Years			5 Years if Event-Free at 1 Year		
	Percutaneous Repair (n = 154)	Surgery (n = 56)	p Value	Repair (n = 87)	Surgery (n = 48)	p Value
Freedom from death, MV surgery, or reoperation, and 3+ or 4+ MR	44.2 (68)	64.3 (36)	0.01	69.0 (60)	75.0 (36)	0.55
Death	20.8 (32)	26.8 (15)	0.36	16.1 (14)	16.7 (8)	>0.99
MV surgery or reoperation	27.9 (43)	8.9 (5)	0.003	5.7 (5)	6.3 (3)	>0.99
3+ or 4+ MR	12.3 (19)	1.8 (1)	0.02	11.5 (10)	2.1 (1)	0.10

Values are % (n). *Includes patients that completed the 5-year visit and had MR grade available or died or had MV surgery before withdrawal from the study.
MR = mitral regurgitation; MV = mitral valve.

Feldman T et al: J Am Coll Cardiol 2015;66:2844-54

TEER a primární MR

TEER pro primární MR – „real life“ data

Transcatheter Mitral Valve Repair for Degenerative Mitral Regurgitation

OBJECTIVE To evaluate the outcomes of transcatheter mitral valve repair for degenerative MR.

DESIGN, SETTING, AND PARTICIPANTS Cohort study of consecutive patients in the Society of Thoracic Surgeons/American College of Cardiology Transcatheter Valve Therapies Registry who underwent nonemergent transcatheter mitral valve repair for degenerative MR in the US from 2014 through 2022.

EXPOSURE Transcatheter edge-to-edge mitral valve repair with the MitraClip device (Abbott).

MAIN OUTCOMES AND MEASURES The primary end point was MR success, defined as moderate or less residual MR and a mean mitral gradient of less than 10 mm Hg. Clinical outcomes were evaluated based on the degree of residual MR (mild or less MR or moderate MR) and mitral valve gradients (≤5 mm Hg or >5 to <10 mm Hg).

RESULTS A total of 19 088 patients with isolated moderate to severe or severe degenerative MR who underwent transcatheter mitral valve repair were analyzed (median age, 82 years; 48% women; median Society of Thoracic Surgeons predicted risk of mortality with surgical mitral valve repair, 4.6%). MR success was achieved in 88.9% of patients. At 30 days, the incidence of death was 2.7%; stroke, 1.2%; and mitral valve reintervention, 0.97%. MR success compared with an unsuccessful procedure was associated with significantly lower mortality (14.0% vs 26.7%; adjusted hazard ratio, 0.49; 95% CI, 0.42-0.56; *P* < .001) and heart failure readmission (8.4% vs 16.9%; adjusted hazard ratio, 0.47; 95% CI, 0.41-0.54; *P* < .001) at 1 year. Among patients with MR success, the lowest mortality was observed in patients who had both mild or less residual MR and mean mitral gradients of 5 mm Hg or less compared with those with an unsuccessful procedure (11.4% vs 26.7%; adjusted hazard ratio, 0.40; 95% CI, 0.34-0.47; *P* < .001).

CONCLUSIONS AND RELEVANCE In this registry-based study of patients with degenerative MR undergoing transcatheter mitral valve repair, the procedure was safe and resulted in successful repair in 88.9% of patients. The lowest mortality was observed in patients with mild or less residual MR and low mitral gradients.

- **STS /ACC Transcatheter Valve Registry 2014 - 2022**
- **19.088 pacientů s transkatetrovou intervencí na mitrální chlopni pro primární MR**
- **Pacienti rozděleni to 3 skupin dle predikovaného chirurgického rizika pro MVP (STS-PROM):**
  - **High risk: > 8% (n=4.186)**
  - **Intermediate risk: 2-8% (n=12.973)**
  - **Low risk: < 2% (n=1.929)**
  - **Průměrné riziko 4,6%**
- **30 denní výsledky:**
  - **Technický úspěch 88,9%**
  - **Mortalita 2,7%**
  - **CMP 1,2%**
- **1 roční výsledky:**
  - **Nižší mortalita a readmise pro srdeční selhání z pacientů s technickým úspěchem**

Makar RJ et al: JAMA 2023;329(20):1778-1788

TEER a primární MR

TEER pro primární MR – „real life“ data – charakteristika souboru

Characteristics	Overall (n = 19 088)	Surgical risk category		
		Low risk (n = 1929)[a]	Intermediate risk (n = 12 973)[a]	High risk (n = 4186)[a]
Age, median (IQR), y	82 (76-86) [n = 19 088]	67 (61-71) [n = 1929]	82 (77-85) [n = 12 973]	87 (83-91) [n = 4186]
Sex, No./total (%)				
Female	9295/19 088 (48.7)	812/1929 (42.1)	6324/12 973 (48.8)	2159/4186 (51.6)
Male	9793/19 088 (51.3)	1117/1929 (57.9)	6649/12 973 (51.3)	2027/4186 (48.4)

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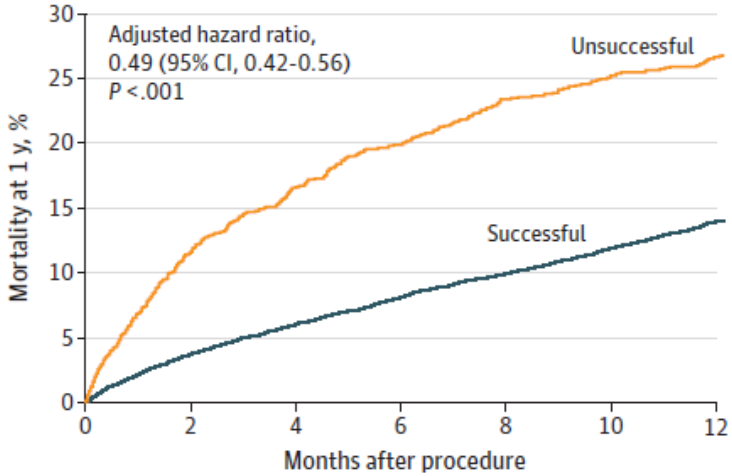
TEER a primární MR

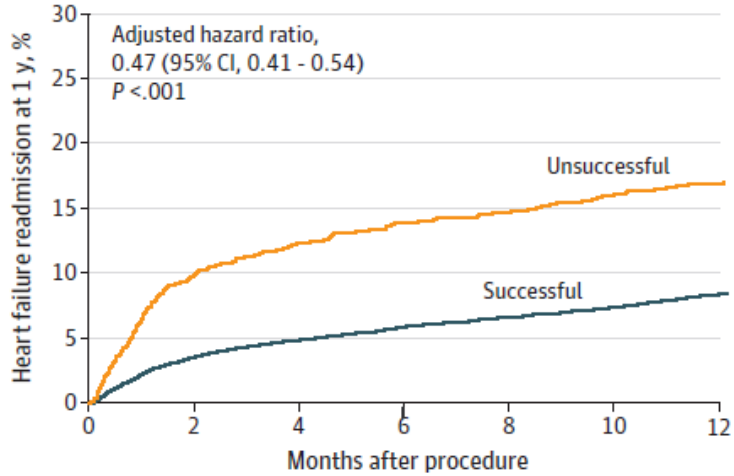
TEER pro primární MR – „real life“ data – mortalita a rehospitalizace pro SS 12 měsíců

Mortality by MR success



Procedure result, No.							
Successful	12 788	9658	9224	8990	8784	8521	6563
Unsuccessful	1669	1124	1030	983	935	898	673

Heart failure readmission by MR success



Procedure result, No.							
Successful	12 788	9369	8859	8575	8334	8039	6171
Unsuccessful	1669	1028	929	879	837	796	597

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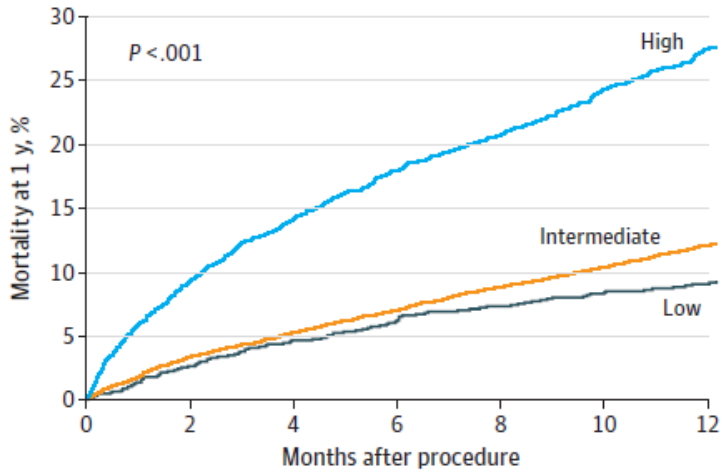
TEER a primární MR

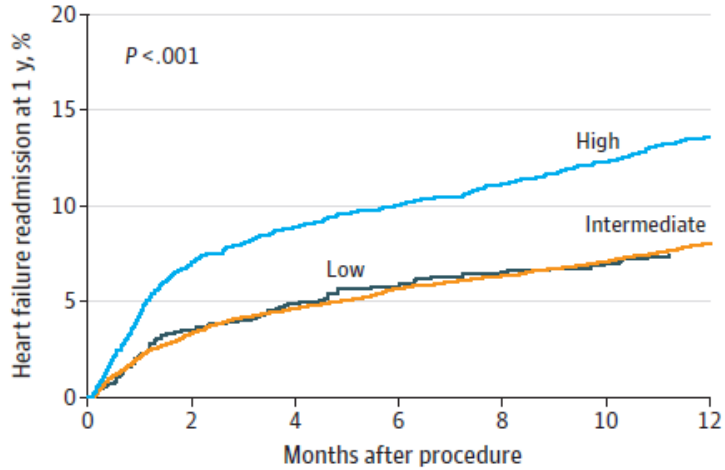
TEER pro primární MR – „real life“ data – mortalita a rehospitalizace pro SS 12 měsíců

Mortality by surgical risk



Risk level, No.							
Low	1346	1030	974	957	938	921	709
Intermediate	9770	7412	7117	6969	6812	6638	5099
High	3517	2426	2240	2122	2042	1929	1484

Heart failure readmission by surgical risk



Risk level, No.							
Low	1346	1001	940	917	893	875	668
Intermediate	9770	7200	6844	6654	6476	6274	4810
High	3517	2278	2077	1958	1871	1751	1343

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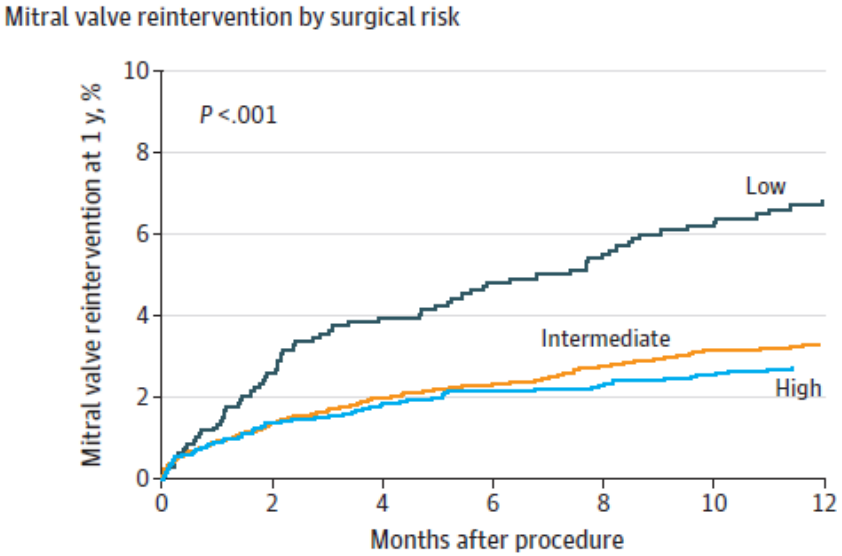
TEER a primární MR

TEER pro primární MR – „real life“ data – reintervence pro reMR 12 měsíců



Risk level, No.							
Low	1346	1008	947	923	899	876	670
Intermediate	9770	7329	6998	6831	6652	6455	4962
High	3517	2403	2211	2090	2006	1888	1453

Makar RJ et al: JAMA 2023;329(20):1778-1788

TEER a primární MR

TEER vs. chirurgie pro primární MR

Surgery and transcatheter intervention for degenerative mitral regurgitation in the United States

Objectives: We evaluated practice trends and 3-year outcomes of transcatheter edge-to-edge repair (TEER) and surgical repair for degenerative mitral regurgitation in the United States.

Methods: From the Centers for Medicare and Medicaid Services data (2012-2019), 53,117 mitral valve interventions (surgery or TEER) were performed for degenerative mitral regurgitation, identified by excluding rheumatic and congenital disease, endocarditis, myocardial infarction, cardiomyopathy, and concomitant or prior coronary revascularizations. Median follow-up was 2.9 years (interquartile range, 1.2-5.1 years). End points were 3-year survival, stroke, mitral reinterventions, and heart failure readmissions.

Results: Volume of total annual mitral interventions did not significantly change ($P = .18$) between 2012 and 2019. However, surgical cases decreased by one-third, whereas TEER increased. Among 27,170 patients (52.5% men; mean age, 73.5 years) who underwent TEER (n = 7755) or surgical repair (n = 19,415), surgical patients were younger (71.8 vs 80.8 years; $P < .001$), with less comorbidity and frailty. In 4532 patient pairs matched for age, frailty, and comorbidity, 3-year survival after TEER was 65.9% (95% CI, 64.3%-67.6%) and 85.7% (95% CI, 84.5%-86.9%) after surgery ($P < .001$). Three years after TEER or surgery, stroke rates were 1.8% (95% CI, 1.5%-2.2%) and 2.0% (95% CI, 1.6%-2.4%) ($P = .49$); heart failure readmission rates were 17.8% (95% CI, 16.7%-18.9%) and 11.2% (95% CI, 10.3%-12.2%) ($P < .001$); and mitral reintervention rates were 6.1% (95% CI, 5.5%-6.9%) and 1.3% (95% CI, 1.0%-1.7%) ($P < .001$), respectively.

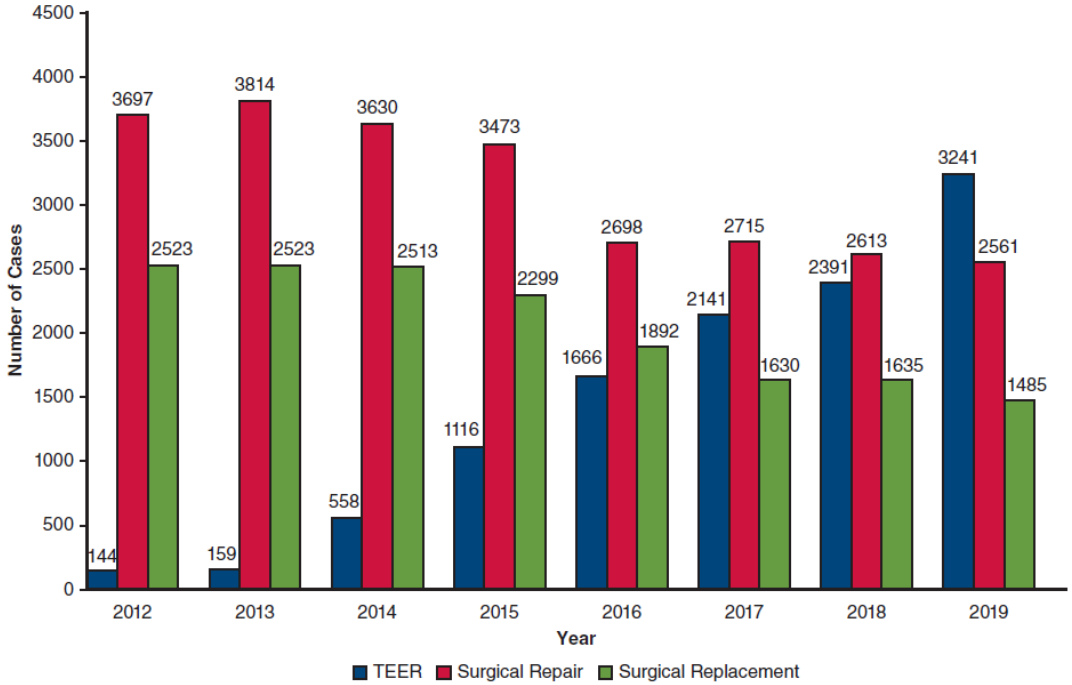
Conclusions: Among Medicare beneficiaries with degenerative mitral regurgitation, an increase in TEER utilization was associated with worse survival, increased heart failure readmissions, and more mitral reinterventions. Randomized trials are needed to better inform treatment choice. (J Thorac Cardiovasc Surg 2025;169:80-8)

- **STS Adult Cardiac Surgical Database 2012 - 2019**
- **53.117 pacientů s intervencí na mitrální chlopni pro primární MR**
- **Exkludováni pacienti s MVR, reintervencemi, kokomitantními a aktuními procedurami atd.**
- **21.170 pacientů analyzováno**
  - **7.755 TEER**
  - **19.415 Chirurgická léčba**
- **„Propensity score matching“**
  - **TEER vs. Chirurgická léčba – 4.532 pacientů**
    - **30 denní mortalita 2,6 vs. 2,5% (p=0,84)**
    - **3 leté přežití 65,9% vs. 85,7% (p<0,001)**
    - **3 letá rehospitalizace pro SS 17,8 vs. 11,2% (p<0,001)**
    - **3 letá reintervence na MCH 6,1 vs. 1,3 % (p<0,001)**

Chikwe J et al: J Thorac Cardiovasc Surg 2025;169:80-8

TEER a primární MR

TEER vs. chirurgie pro primární MR – počet intervencí



Chikwe J et al: J Thorac Cardiovasc Surg 2025;169:80-8

TEER a primární MR

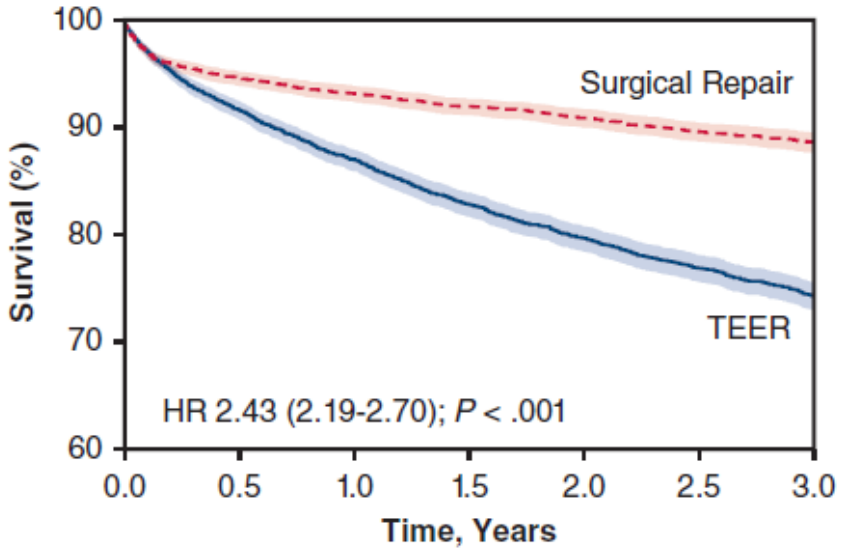
TEER vs. chirurgie pro primární MR – charakteristika souboru

Variable	All patients			Propensity score-matched patients			
	TEER (n = 7755)	Surgical repair (n = 19,415)	*P* value	TEER (n = 4532)	Surgical repair (n = 4532)	Standardized difference	*P* value
Age (y)	80.8 ± 8.0	70.6 ± 8.1	<.001	77.3 ± 8.0	76.5 ± 6.7	12.4	.50
Male sex	3802 (49.0)	10,484 (54.0)	<.001	2346 (51.8)	2356 (52.0)	−0.4	.55
White race	7046 (90.9)	17,286 (89.0)	<.001	4101 (90.5)	4084 (90.1)	1.3	.53
Diabetes	2099 (27.1)	5413 (27.9)	.18	1258 (27.8)	1245 (27.5)	0.6	.76
Hypertension	6580 (84.9)	16,035 (82.6)	<.001	3832 (84.6)	3798 (83.8)	2.0	.33
Hyperlipidemia	4903 (63.2)	12,166 (62.7)	.38	2885 (63.7)	2862 (63.2)	1.1	.62
Peripheral vascular disease	659 (8.5)	1536 (7.9)	.11	380 (8.4)	380 (8.4)	0.0	1.0
Prior stroke	196 (2.5)	535 (2.8)	.29	108 (2.4)	106 (2.3)	0.3	.89
Cerebrovascular disease	763 (9.9)	1777 (9.2)	.08	450 (9.9)	404 (8.9)	3.5	.10
Prior carotid surgery	98 (1.3)	212 (1.1)	.23	59 (1.3)	54 (1.2)	1.0	.64
Chronic kidney disease	1687 (21.8)	3502 (18.0)	<.001	935 (20.6)	884 (19.5)	2.8	.18
Chronic obstructive pulmonary disease	2373 (30.6)	5819 (29.9)	.31	1407 (31.0)	1370 (30.2)	1.8	.40
Liver disease	762 (9.8)	2163 (11.1)	.002	460 (10.2)	461 (10.2)	−0.1	.97
Atrial fibrillation	3689 (47.6)	7725 (39.8)	<.001	2028 (44.7)	1998 (44.1)	1.3	.67
Congestive heart failure	6066 (78.2)	14,843 (76.5)	.002	3511 (77.5)	3502 (77.3)	0.5	.82
Coronary artery disease	3924 (50.6)	7020 (36.2)	<.001	2128 (47.0)	2151 (47.5)	−1.0	.62
Coagulation disorder	1101 (14.2)	2071 (10.7)	<.001	587 (13.0)	604 (13.3)	−1.1	.60
Drug abuse	137 (1.8)	531 (2.7)	<.001	88 (1.9)	82 (1.8)	0.9	.64
Smoking	2207 (28.5)	5926 (30.5)	.001	1363 (30.1)	1366 (30.1)	−0.1	.95
Alcohol abuse	223 (2.9)	750 (3.9)	<.001	144 (3.2)	160 (3.5)	−2.0	.35
Cancer	1198 (15.5)	2495 (12.9)	<.001	667 (14.7)	660 (14.6)	0.4	.84
Charlson score	2 (0-4)	0 (0-1)	<.001	1.0 (0-3)	1.0 (0-3)	2.8	.65
Frailty score	0.26 (0.16-0.38)	0.08 (0.05-0.15)	<.001	0.18 (0.11-0.27)	0.16 (0.09-0.26)	9.0	.91
Procedure year, mean	2016.9	2015.2	<.001	2016.5	2016.4	5.5	.40

Chikwe J et al: J Thorac Cardiovasc Surg 2025;169:80-8

TEER a primární MR

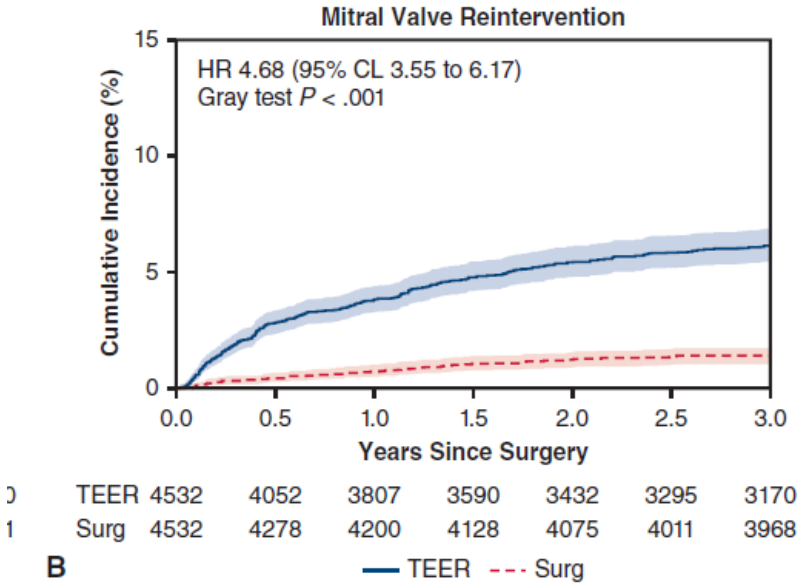
TEER vs. chirurgie pro primární MR – 3 leté výsledky – „propensity matched“ - přežívání

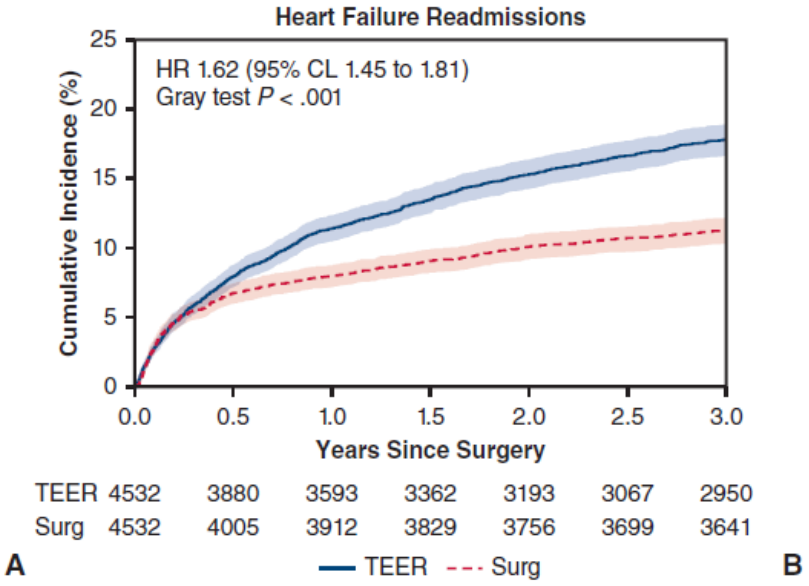


Chikwe J et al: J Thorac Cardiovasc Surg 2025;169:80-8

TEER a primární MR

TEER vs. chirurgie pro primární MR – 3 leté výsledky – „propensity matched“ – MVre & HF





Chikwe J et al: J Thorac Cardiovasc Surg 2025;169:80-8

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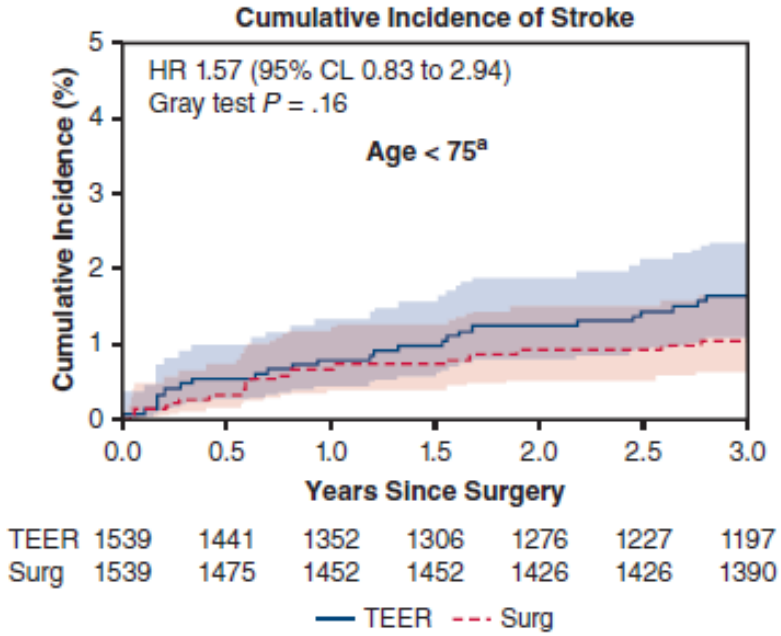
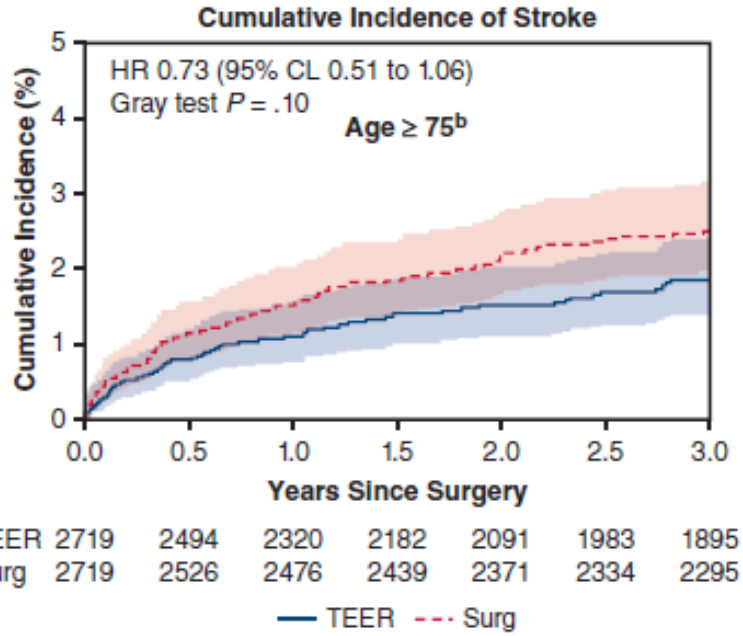
TEER a primární MR

TEER vs. chirurgie pro primární MR – 3 leté výsledky – „propensity matched“ – CMP





Chikwe J et al: J Thorac Cardiovasc Surg 2025;169:80-8

www.fnmotol.cz

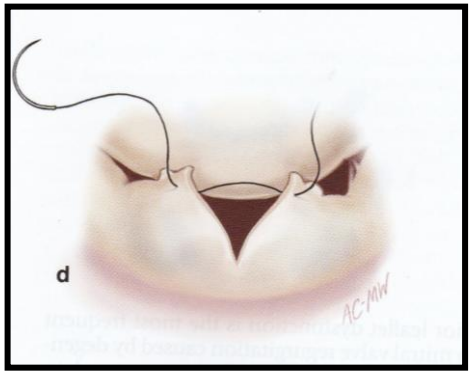
TEER a primární MR

TEER vs. chirurgie

Pohled kardiochirurga????

TEER a primární MR

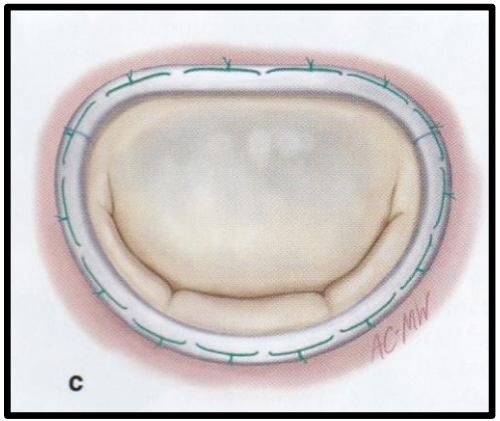
Primární MR – chirurgická plastika chlopně

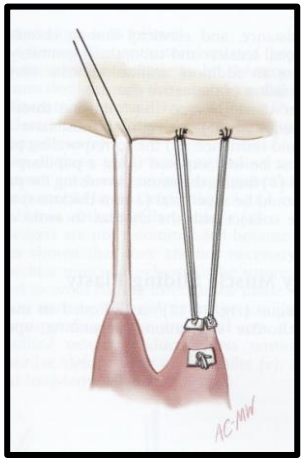


KOREKCE LÉZE !!!!!!

+

REMODELACE ANULU !!!!!!

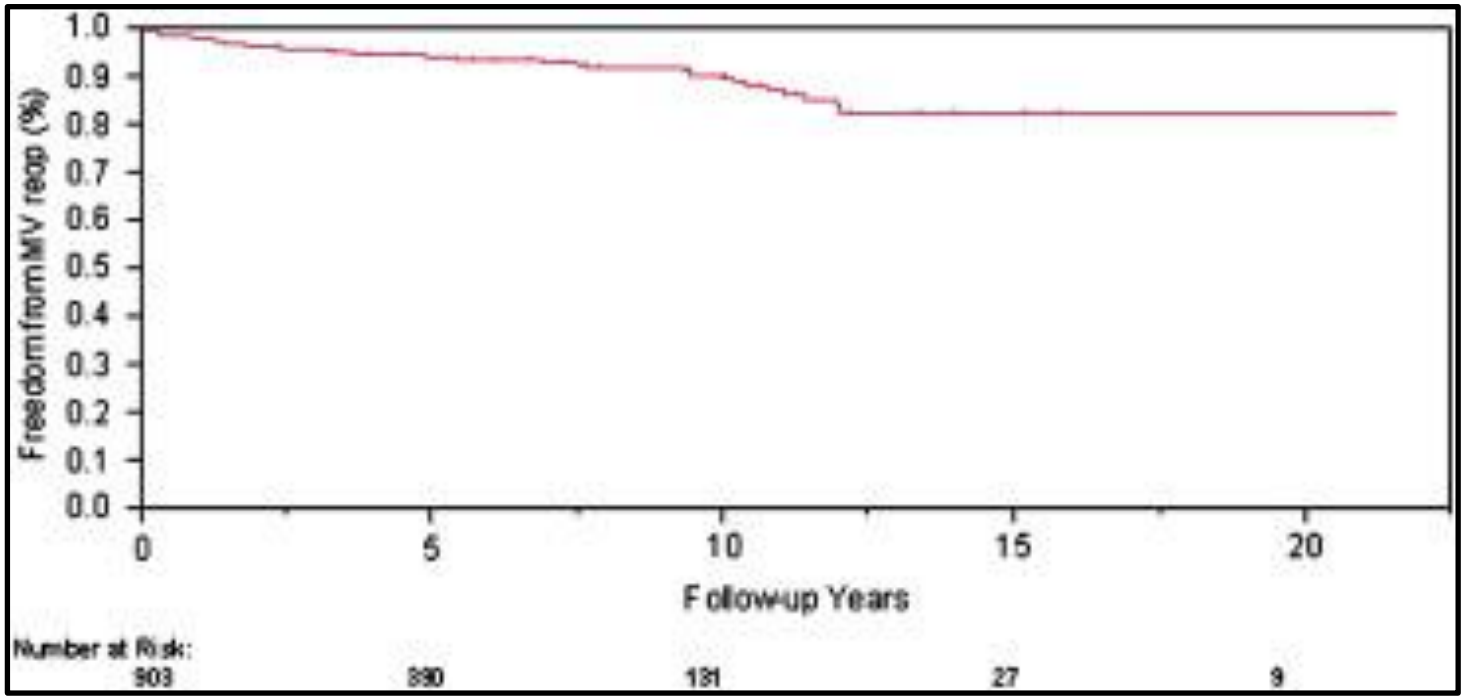




Carpentier A, Adams DH, Filsoufi F, Saunders Elsevier 2010

TEER a primární MR

Primární MR – přežívání bez reoparace – 80% po 20 letech



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

TEER a primární MR

Primární MR – „double-orifice“ – význam použití anuloplastického prstence

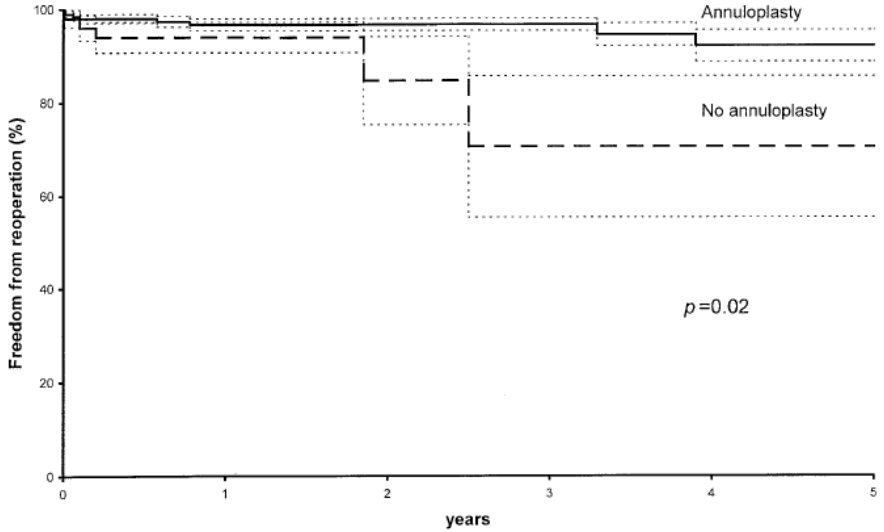


Figure 4. Freedom from reoperation in patients who received an annuloplasty procedure versus those who did not. *Dotted lines* depict SE estimates for the actuarial curves.

Alfieri O et al: J Thorac Cardiovasc Surg 2001;122:674-681

TEER a primární MR

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

TEER a primární MR

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 = 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.

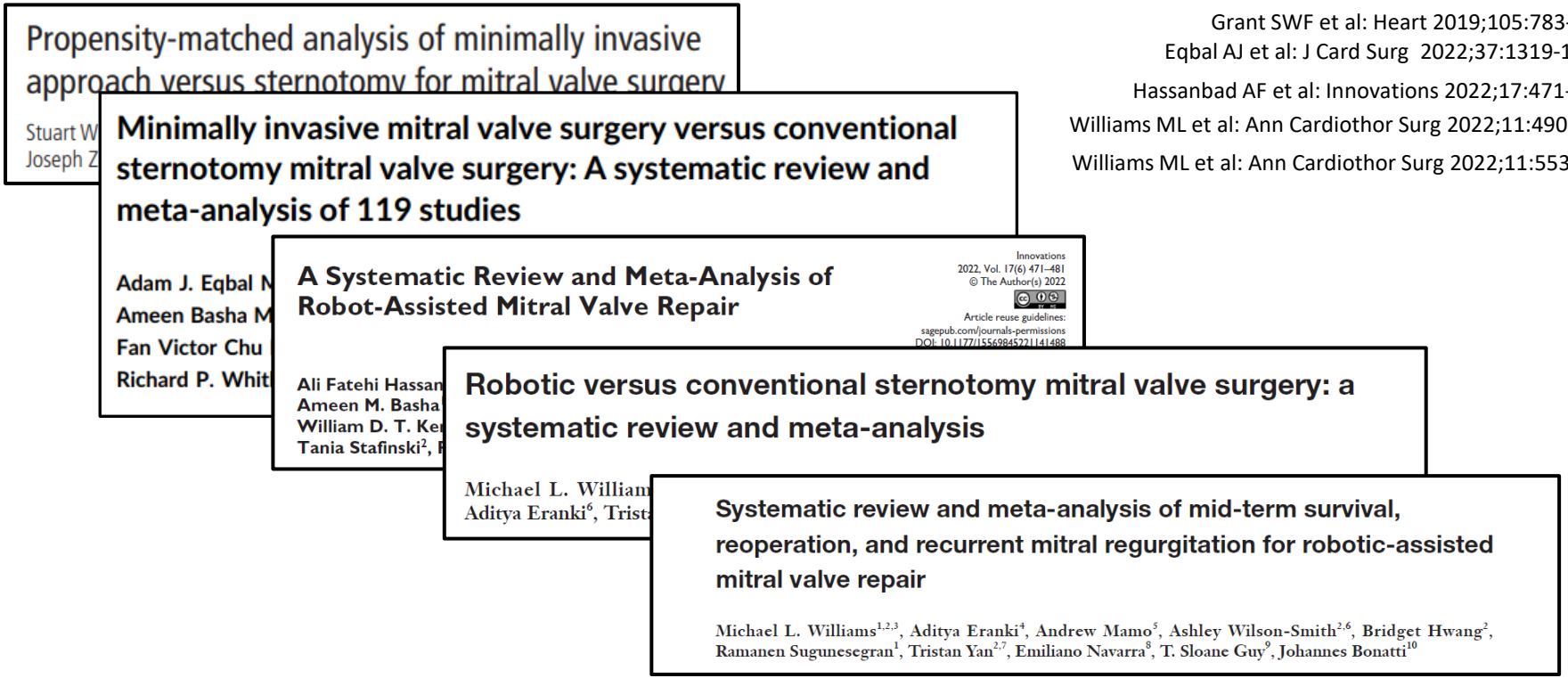
(Ann Thorac Surg 2015;■:■–■)

0,18 %

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

TEER a primární MR

Primární MR – minivazivní a robotická chirurgie MCH – 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

TEER a primární MR

Primární MR – minivazivní a robotická chirurgie MCH – 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
Williams ML et al: Ann Cardiothor Surg 2022;11:490-503
Williams ML et al: Ann Cardiothor Surg 2022;11:553-563

TEER a primární MR

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.

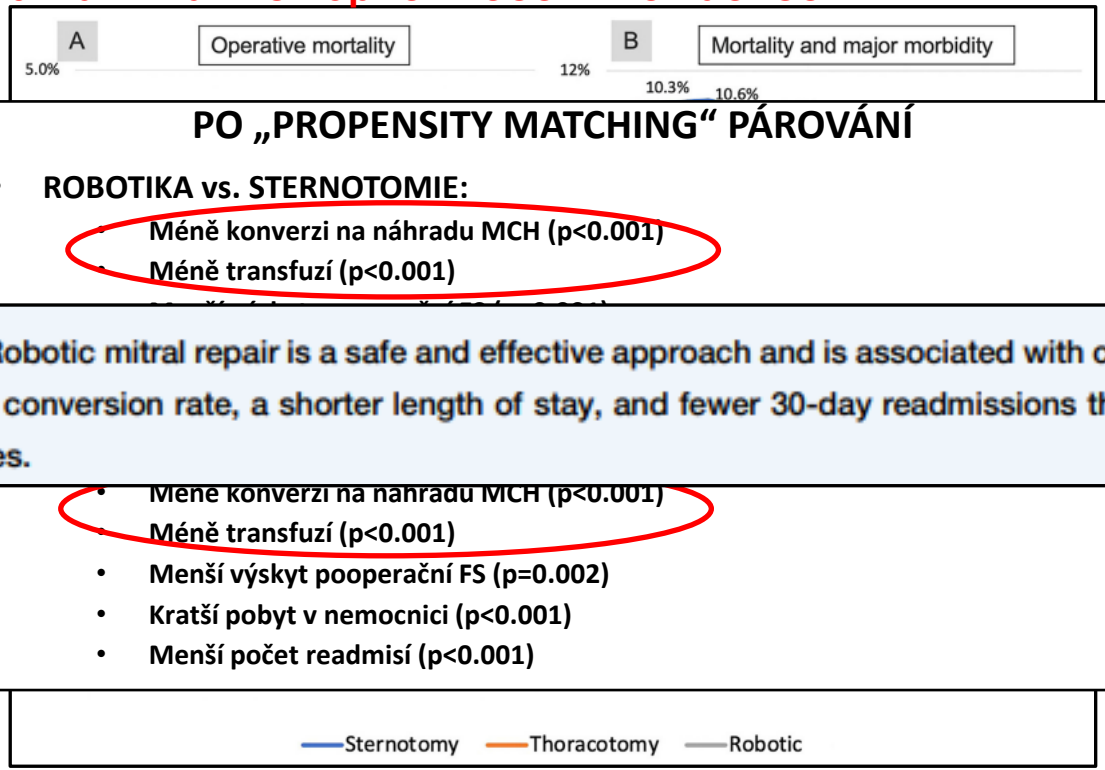
(Ann Thorac Surg 2023;■:■-■)
Published by Elsevier Inc. on behalf of The Society of Thoracic Surgeons

- 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 2023 in press

TEER a primární MR

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 2023 in press

Závěry

- **TEER je u PRIMÁRNÍ MR, dle současných guidelines, určen pro pacienty s vyšším/vysokým chirurgickým rizikem pro chirurgickou intervenci na mitrální chlopni**
- **U těchto pacientů se jedná o metodu s velmi dobrými krátkodobými výsledky, které mají v případě úspěšné intervence pozitivní vliv na přežívání pacientů**
- **„Real life“ data ukazují rostoucí zastoupení TEER u pacientů s nízkým chirurgickým rizikem**
- **Ve střednědobém sledování nenabízí TEER ve srovnání s chirurgickým přístupem srovnatelné výsledky co se týká přežití, reintervence na mitrální chlopni a rehospitalizací pro srdeční selhání**
- **Chybí výsledky recentních prospektivních randomizovaných studií, nicméně řada z nich je ve stádiu náboru pacientů (PRIMARY, MITRA-HR a REPAIR-MR)**
- **Současně s technickým rozvojem transkatetrových technik se vyvíjí i chirurgická technika s posunem k miniivazivním a robotickým výkonům, což by mělo být při budoucích studiích, srovnávajících obě techniky, zohledněno**

Děkuji za pozornost !!!!