Transcatheter Valve Therapy Breakthroughs

Evolving Transcatheter Mitral Valve Repair and Replacement Therapies

Ted Feldman, M.D., MSCAI FACC FESC

Evanston Hospital

20th CardioVascular Summit
TCTAP 2015
Seoul
April 28th-May 1st 2015

NorthShore University HealthSystem
Evanston Hospital

Ted Feldman MD, *MSCAI FACC FESC*

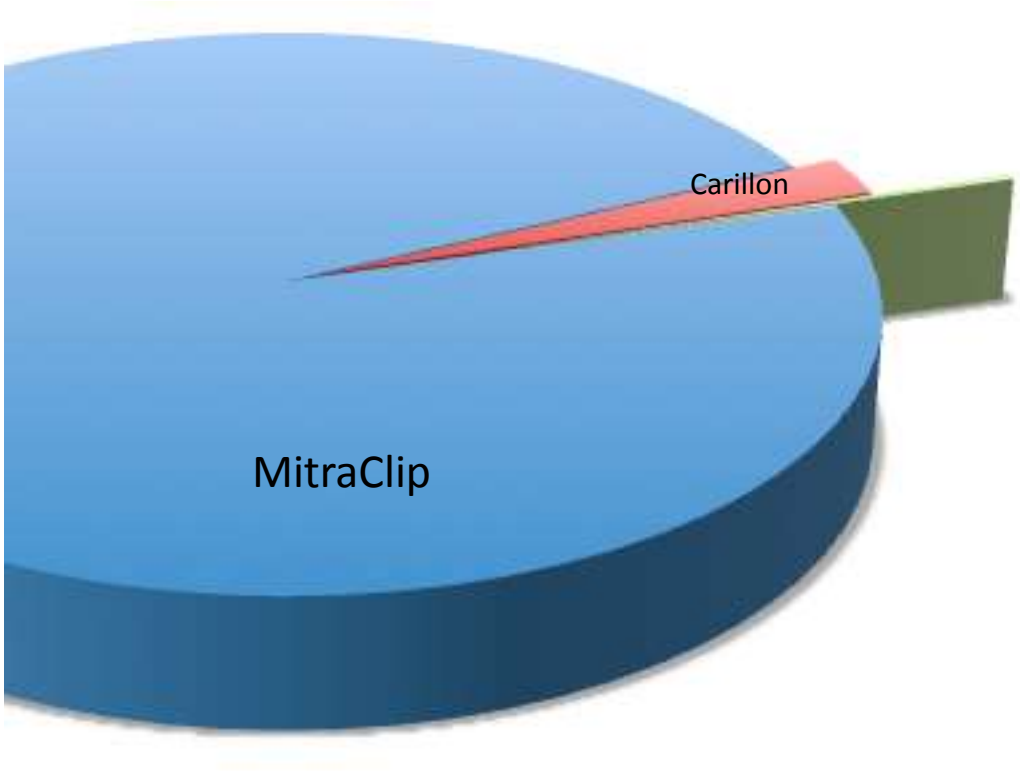
Disclosure Information

The following relationships exist:

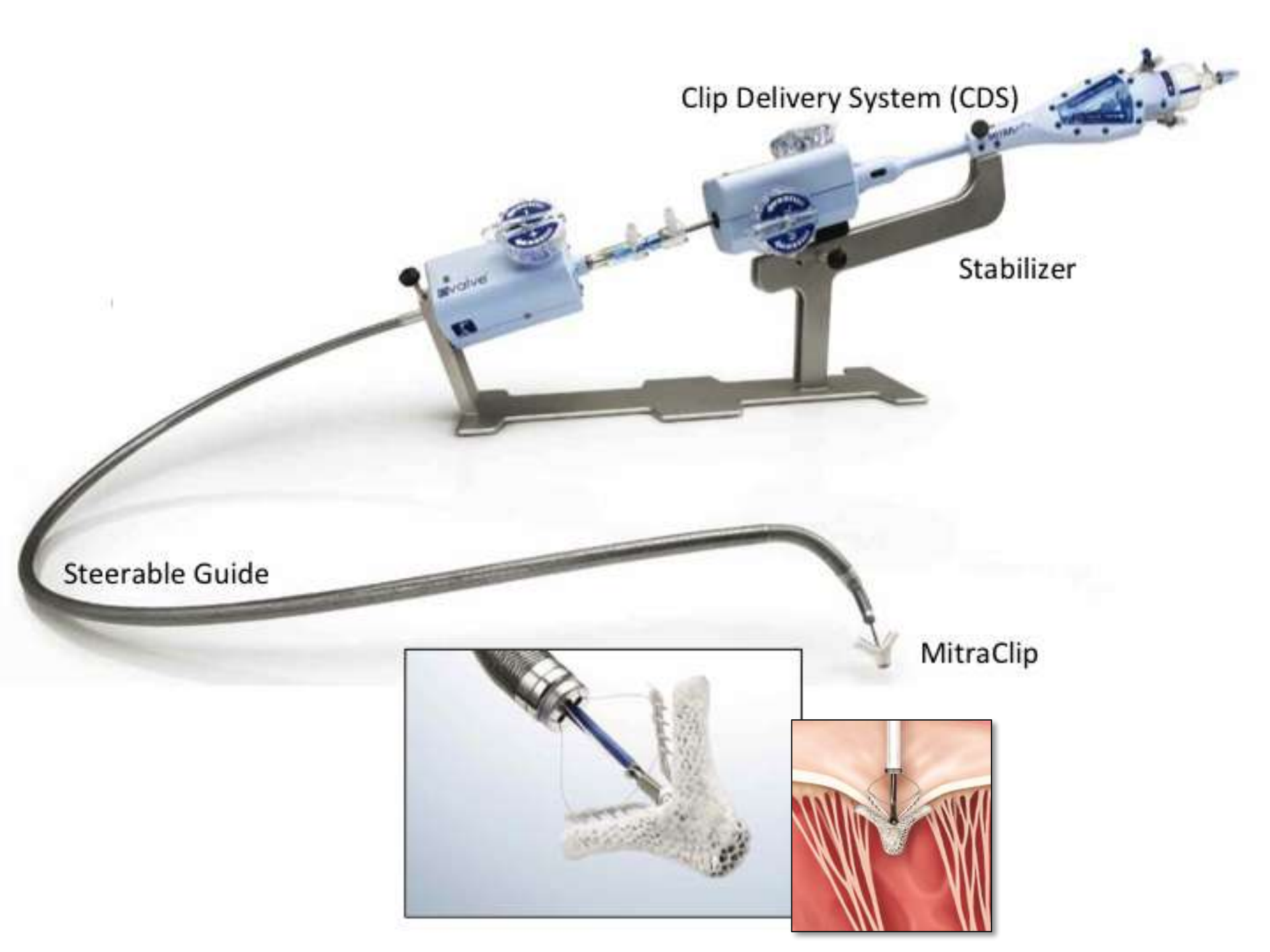
Grant support: Abbott, BSC, Edwards, WL Gore
Consultant: Abbott, BSC, Coherex, Edwards, JenaValve, Diiachi Sankyo-Lilly, WL Gore

Off label use of products and investigational devices will be discussed in this presentation

Treated Patients



MitraClip	>19,000
Carillon	>300
Mitralign	>60
Cardioband	>40
Replacement	>25


Clip Delivery System (CDS)
Stabilizer
Steerable Guide
MitraClip

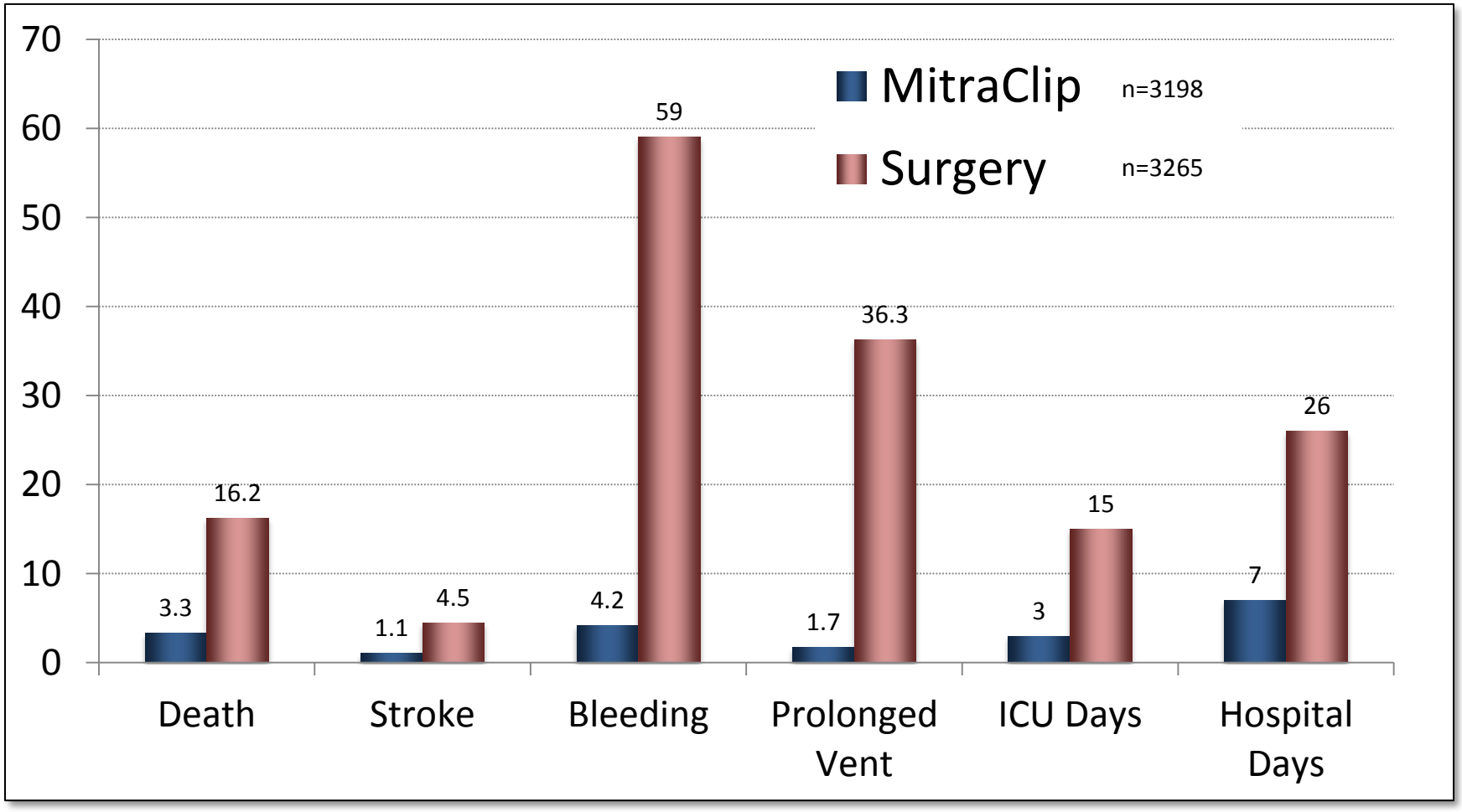
MitraClip

- **Surgical candidates- 5 year EVEREST II randomized trial**
  - Better MR reduction with surgery
  - Stable reductions in LV chamber volumes
  - Stable annular dimensions without annuloplasty
- **High risk global experience**
  - Improved symptoms
  - Procedural safety, short stay
  - Decreased heart failure hospitalizations
- **High risk DMR**
  - US approval
- **High risk FMR US COAPT Trail**
  - Randomized MitraClip vs GDMT ± CRT

MitraClip Systematic Review

MitraClip vs Surgery 30 Day Outcomes

High Risk Patients



21 studies

PhilipF et al, Cathet Cardiovasc Intervent 84:581, 2014

NorthShore University HealthSystem
Evanston Hospital

Improved Functional Status and Quality of Life in Prohibitive Surgical Risk Patients With Degenerative Mitral Regurgitation After Transcatheter Mitral Valve Repair

D. Scott Lim, MD,* Matthew R. Reynolds, MD, MSc,†‡ Ted Feldman, MD,§ Saibal Kar, MD,‖
Howa
Paul G

METHODS A prohibitive-risk DMR cohort was identified by a multidisciplinary heart team that retrospectively evaluated high-risk DMR patients enrolled in the EVEREST (Endovascular Valve Edge-to-Edge Repair Study) II studies.

RESULTS A total of 141 high-risk DMR patients were consecutively enrolled; 127 of these patients were retrospectively identified as meeting the definition of *prohibitive risk* and had 1-year follow-up (median: 1.47 years) available. Patients were elderly (mean age: 82.4 years), severely symptomatic (87% New York Heart Association class III/IV), and at prohibitive surgical risk (STS score: 13.2 ± 7.3%). TMVR (MitraClip) was successfully performed in 95.3%; hospital stay was 2.9 ± 3.1 days. Major adverse events at 30 days included death in 6.3%, myocardial infarction in 0.8%, and stroke in 2.4%. Through 1 year, there were a total of 30 deaths (23.6%), with no survival difference between patients discharged with MR ≤1+ or MR 2+. At 1 year, the majority of surviving patients (82.9%) remained MR ≤2+ at 1 year, and 86.9% were in New York Heart Association functional class I or II. Left ventricular

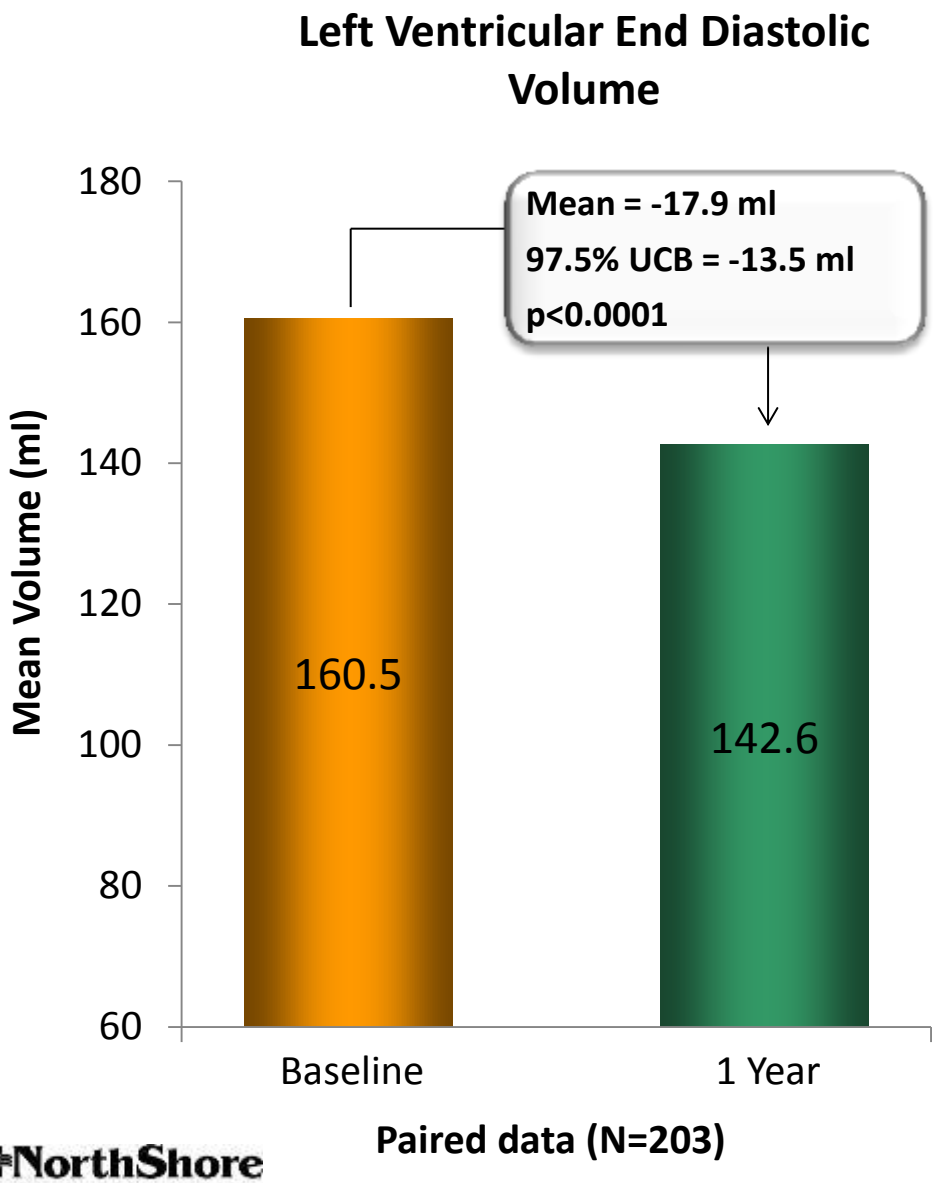
CONCLUSIONS TMVR in prohibitive surgical risk patients is associated with safety and good clinical outcomes, including decreases in rehospitalization, functional improvements, and favorable ventricular remodeling, at 1 year. (Real World Expanded Multi-center Study of the MitraClip System [REALISM]; NCT01931956)

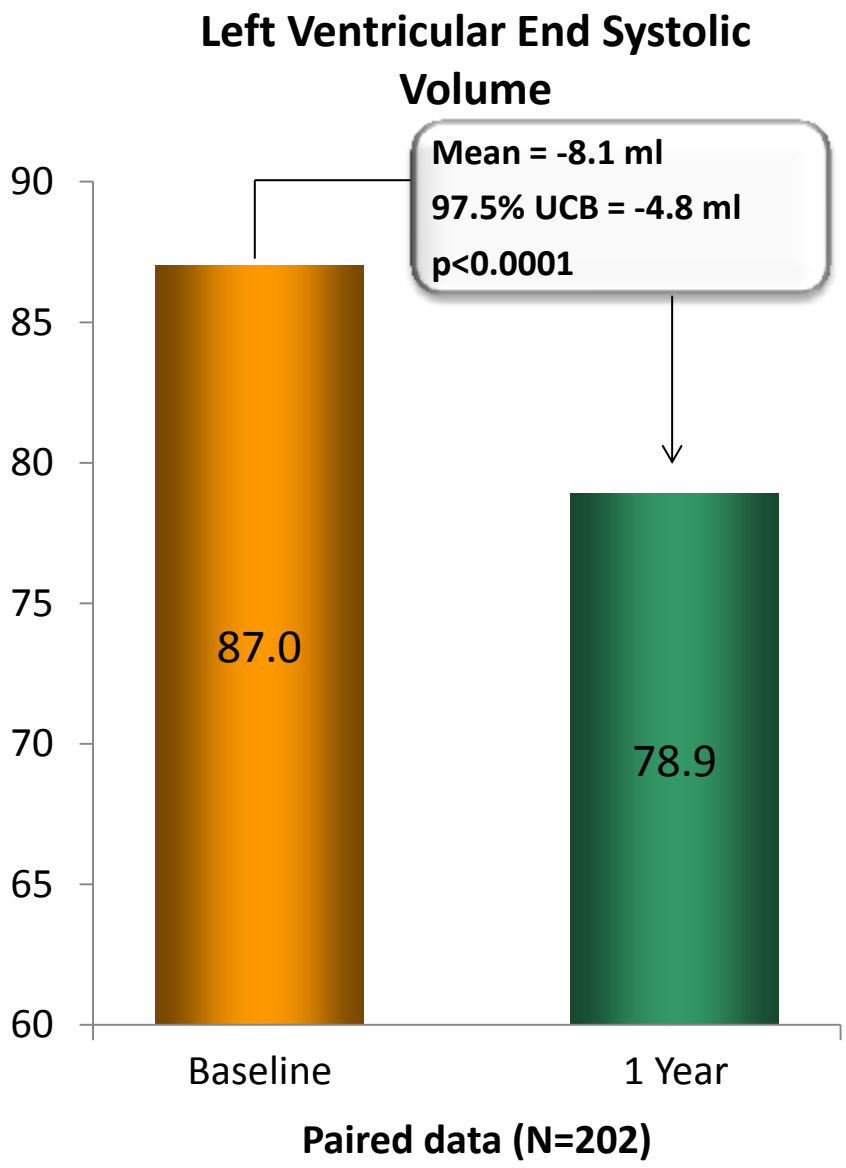
TMVR in prohibitive surgical risk patients is associated with safety and good clinical outcomes, including decreases in rehospitalization, functional improvements, and favorable ventricular remodeling, at 1 year.

NorthShore University HealthSystem
Evanston Hospital

J Am Coll Cardiol 2014;64:182–92

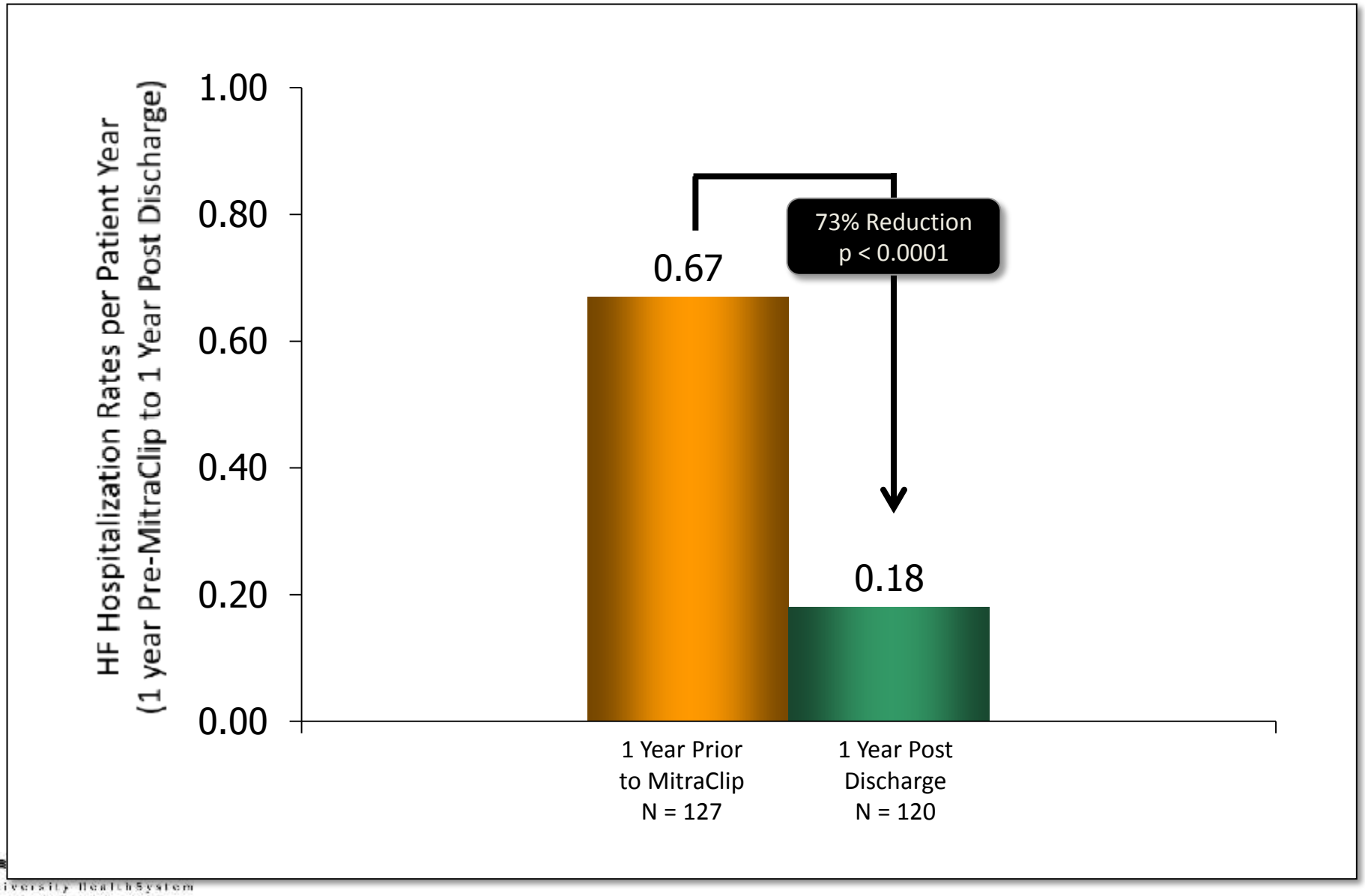
Left Ventricular Volumes



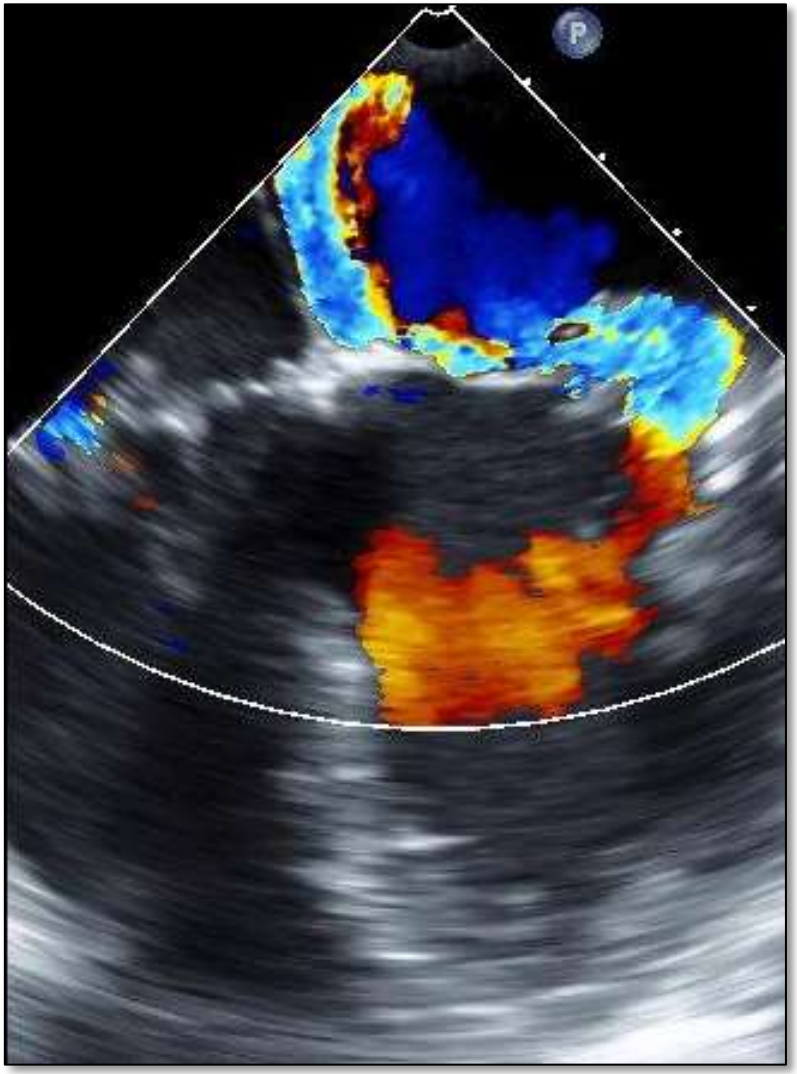


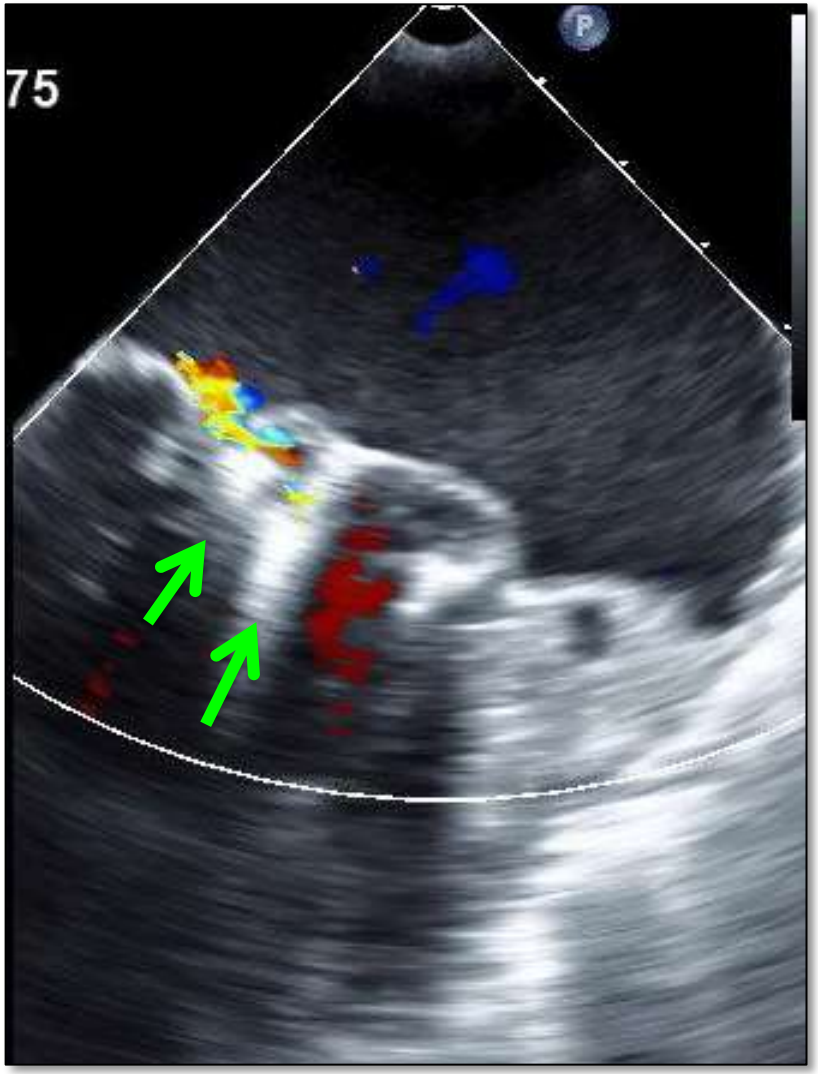
NorthShore University HealthSystem
Evanston Hospital

Hospitalizations For Heart Failure



Degenerative MR Case Example
Pre vs Post- 2 Clips





87M - Hospitalizations for CHF
EF 70% - PASP 50mmHg
STS - Repair 7.5% Replace 11%

NorthShore University HealthSystem
Evanston Hospital

The EVEREST II Randomized Clinical Trial: 5 Year Outcomes By MR Etiology

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 APRIL 14, 2011 VOL. 364 NO. 15

Percutaneous Repair or Surgery for Mitral Regurgitation

Ted Feldman, M.D., Elyse Foster, M.D., Donald G. Glower, M.D., Saibal Kar, M.D., Michael J. Rinaldi, M.D., Peter S. Fail, M.D., Richard W. Smalling, M.D., Ph.D., Robert Siegel, M.D., Geoffrey A. Rose, M.D., Eric Engeron, M.D., Catalin Loghin, M.D., Alfredo Trento, M.D., Eric R. Skipper, M.D., Tommy Fudge, M.D., George V. Letsou, M.D., Joseph M. Massaro, Ph.D., and Laura Mauri, M.D., for the EVEREST II Investigators*

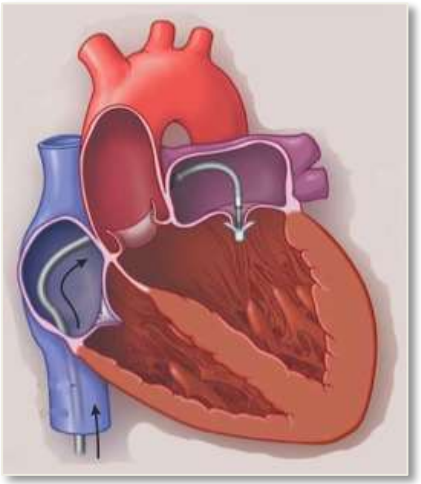
BACKGROUND

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

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.

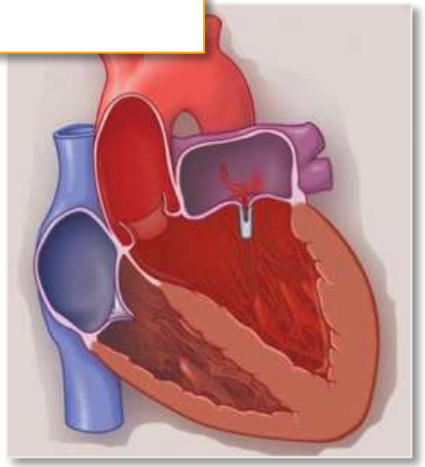
CONCLUSIONS

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.)



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.

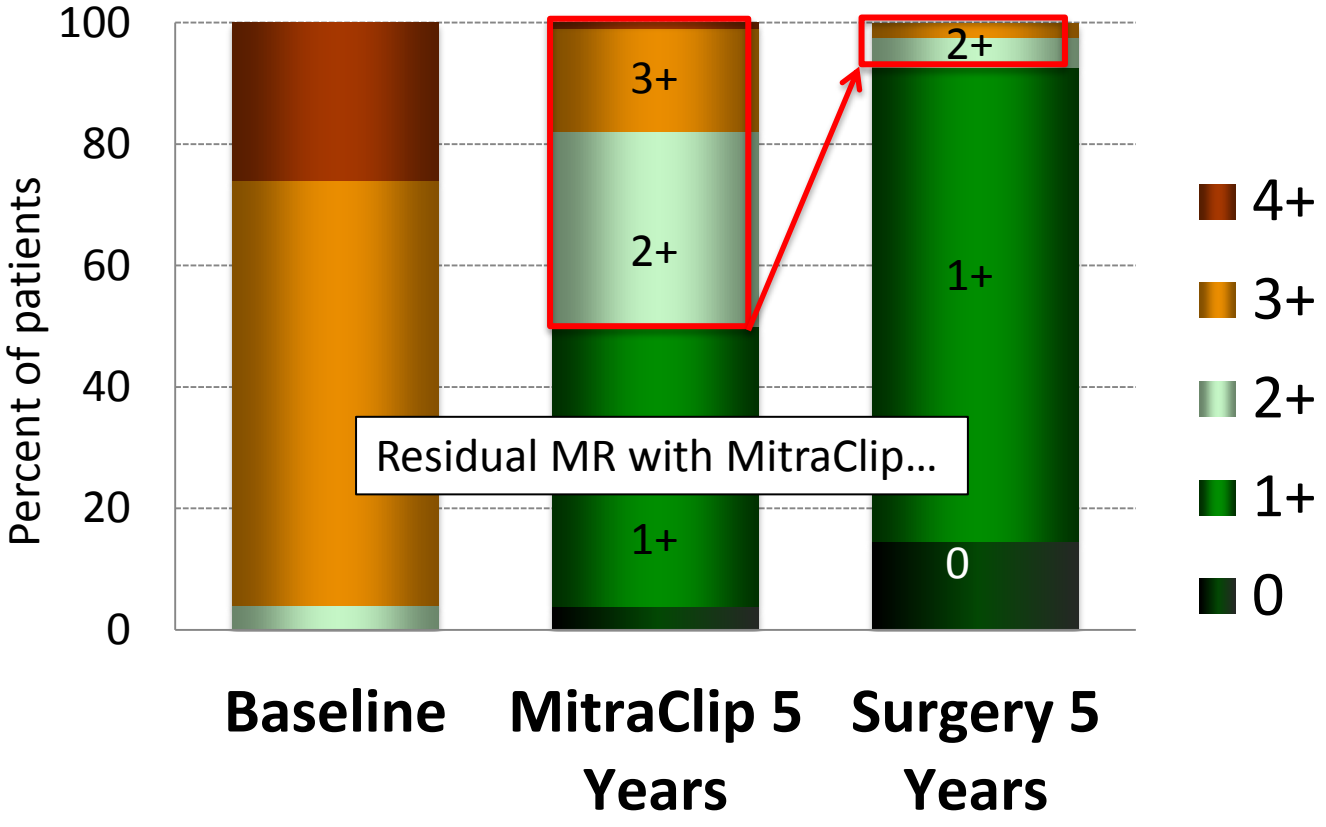


NorthShore University HealthSystem
Evanston Hospital

5 year Follow-Up

Mitral Regurgitation Grade

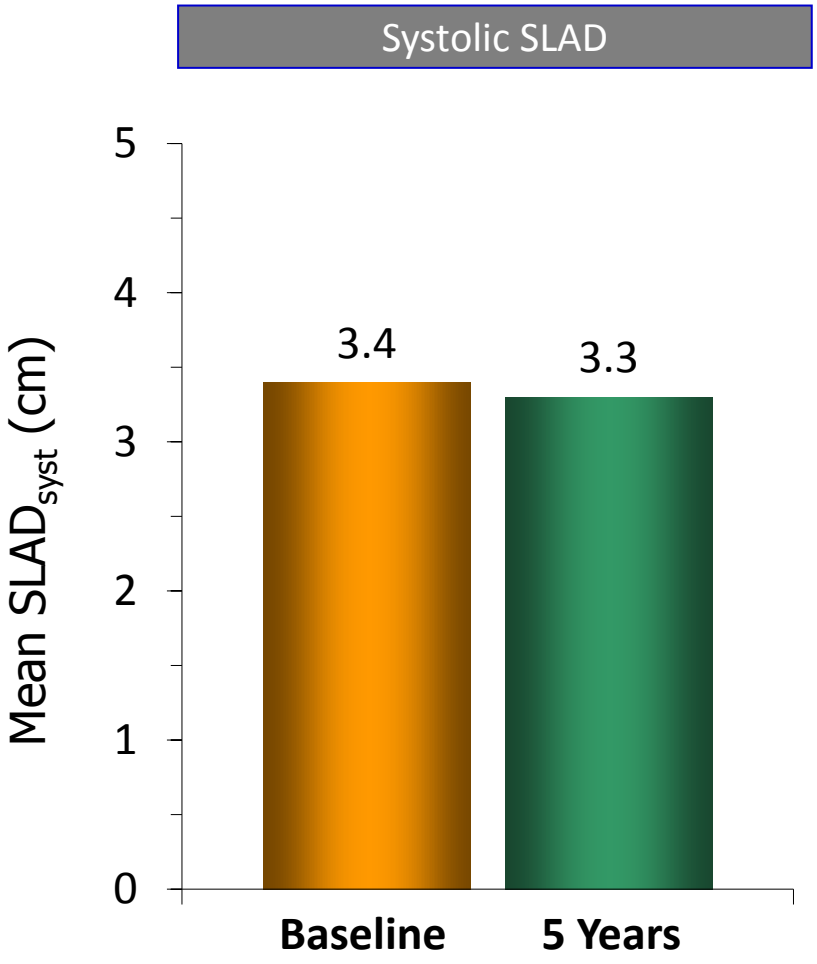
EVEREST II RCT All Treated Patients (N=258)

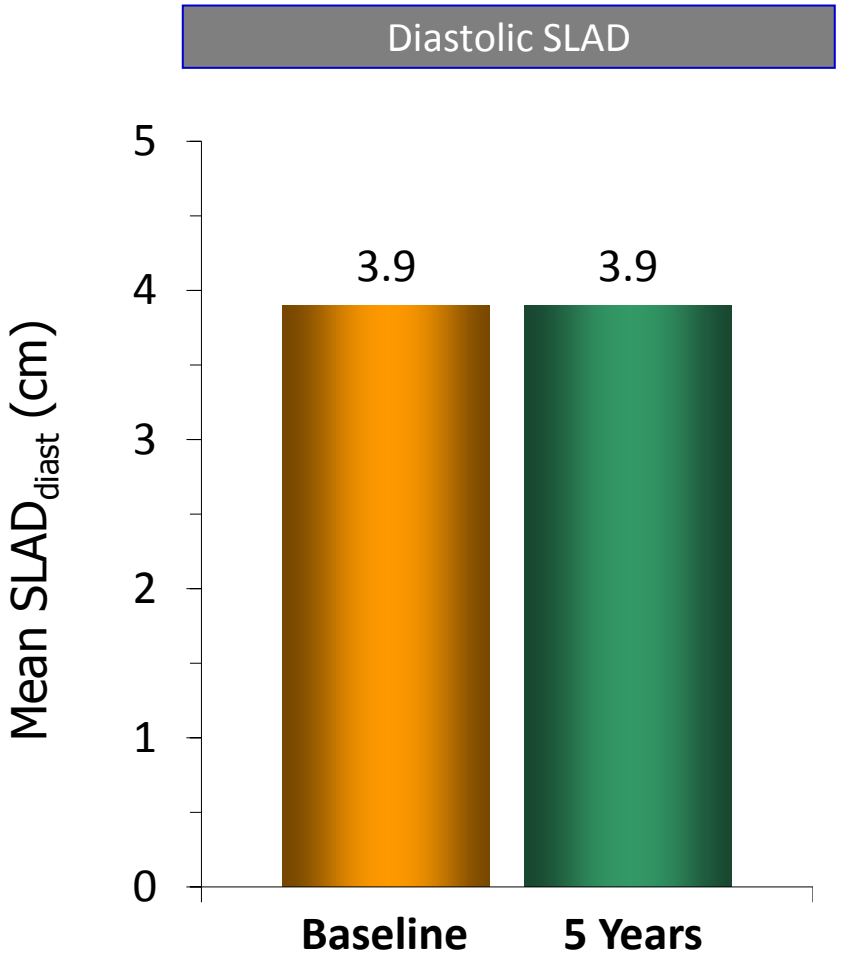


NorthShore University HealthSystem
Evanston Hospital

Septal Lateral Annular Dimensions

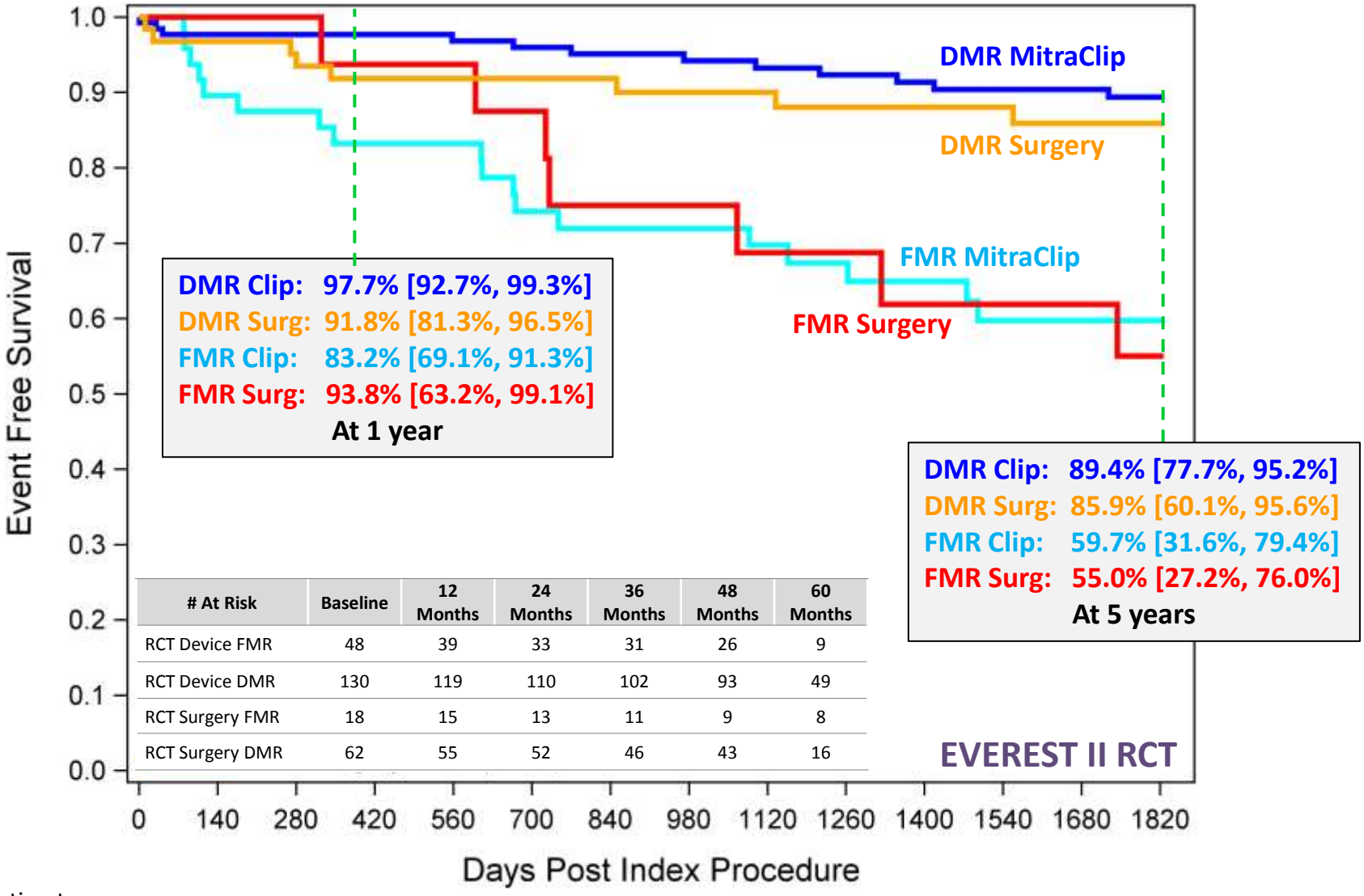
EVEREST II RCT All Treated Patients - MitraClip Group (N=178)





NorthShore University HealthSystem
Evanston Hospital

Freedom From Mortality & Reintervention



# At Risk	Baseline	12 Months	24 Months	36 Months	48 Months	60 Months
RCT Device FMR	48	39	33	31	26	9
RCT Device DMR	130	119	110	102	93	49
RCT Surgery FMR	18	15	13	11	9	8
RCT Surgery DMR	62	55	52	46	43	16

Kaplan-Meier estimate

Therapy for MR

	Degenerative	**Functional**
Low Surgical Risk	Surgical Mitral Repair	?
High Surgical Risk	Commercial MitraClip	COAPT

Clinical Outcomes Assessment of the MitraClip Percutaneous Therapy for High Surgical Risk

COAPT TRIAL

~430 patients enrolled at up to 75 US sites

Significant FMR ≥3+ core lab; EF<50%; CHF hospitalization or BNP>300

High risk for mitral valve surgery- Local Heart Team

Specific valve anatomic criteria

Randomize 1:1

MitraClip

Control group Standard of care

Safety: Composite death, stroke, worsening renal function, LVAD implant, heart transplant at 12 months

Effectiveness: Recurrent heart failure hospitalizations

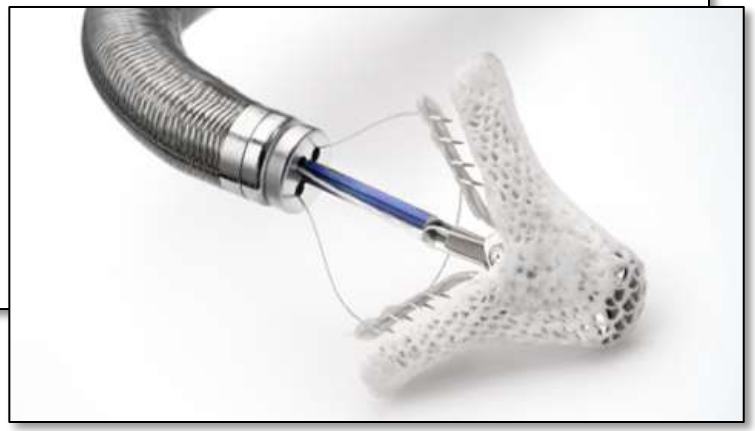
NorthShore University HealthSystem
Evanston Hospital

COAPT Inclusion

- Symptomatic functional MR (≥3+)
  - Cardiomyopathy ischemic or non-ischemic
- LVEF ≥20% and ≤50%
- HF hospitalization ≤12 months and/or a corrected BNP ≥300 pg/ml or NT-proBNP ≥1500 pg/ml ≤90 days
- TTE on optimal therapy ≥30 days after:
  - any change in GDMT
  - revascularization and/or implant of CRT

MitraClip Status

- 20,533 total implants
- 463 global sites in 35 countries
- 1718 US commercial implants
- 112 commercial US sites
- 75 active COAPT sites
  - 195 patients randomized



Abbott Vascular updated March 18th 2015

NorthShore University HealthSystem
Evanston Hospital

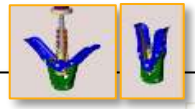
Percutaneous Mitral Repair Devices

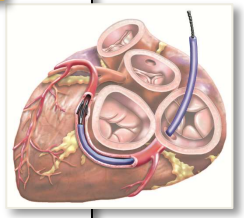
Already gone

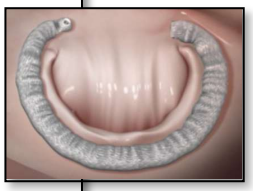
- PTMA
- Monarc
- Mobuis leaflet repair
- Recor RF annular remodeling
- Coapsys

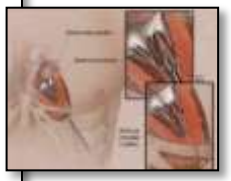
Still developing

- Leaflet repair
- CS annuloplasty
- Direct annuloplasty
- Cerclage
- Mitral spacer
- Midle Peak
- Chordal replacement
- Valve replacement

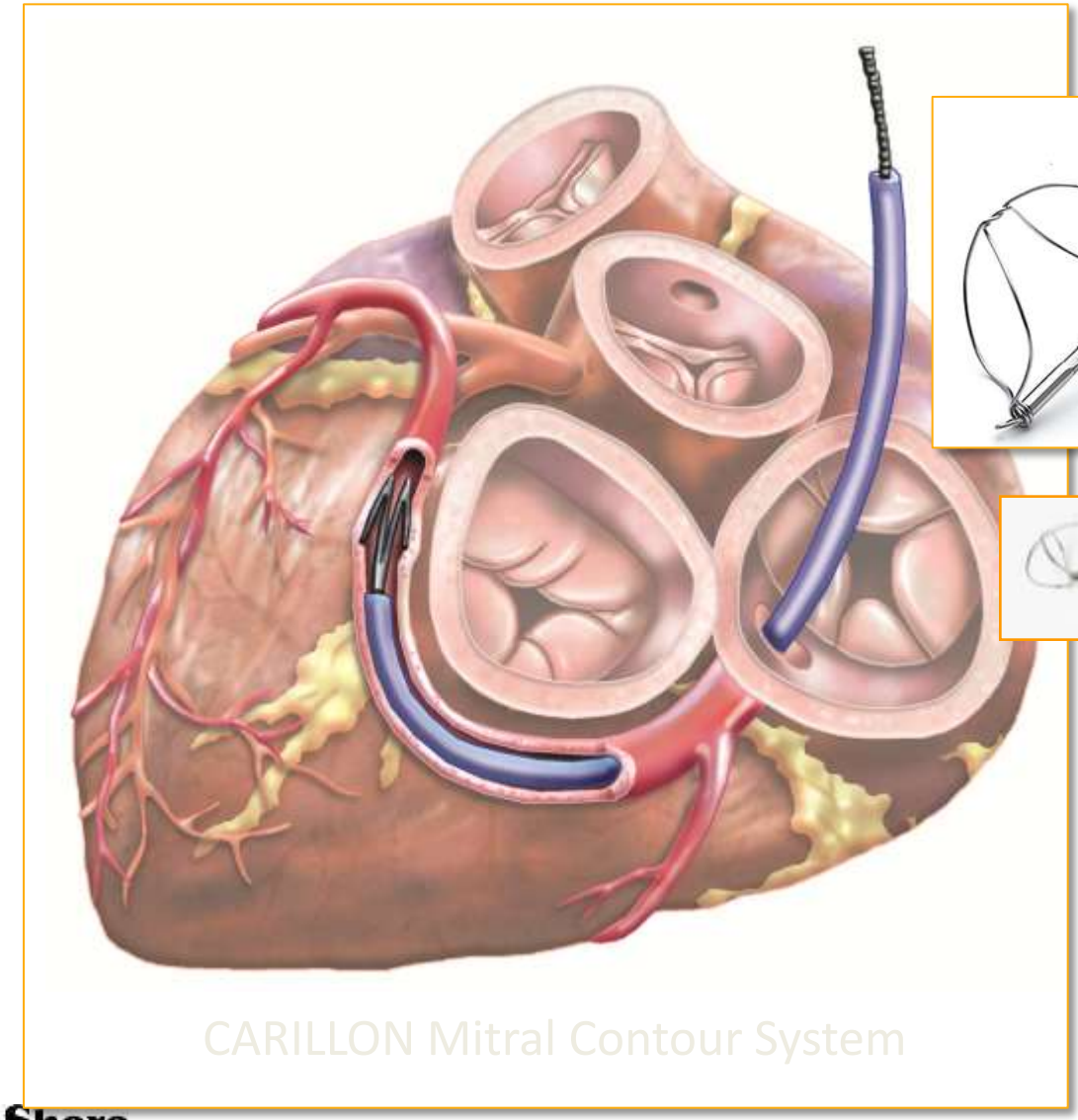




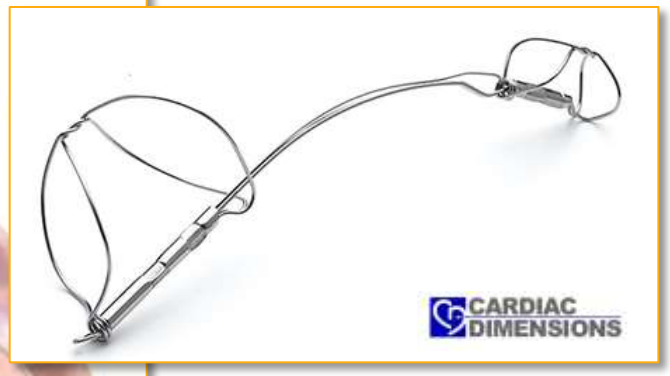




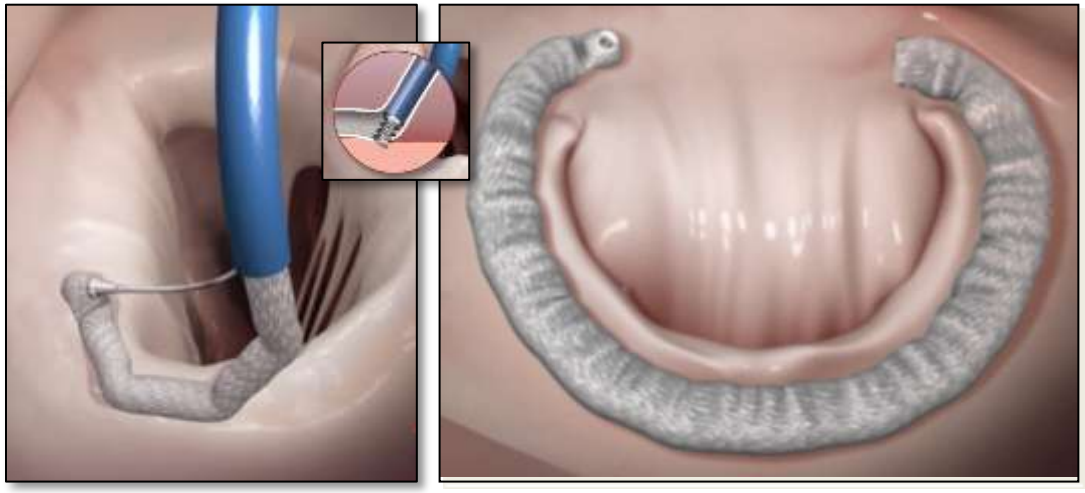
Coronary Sinus- Indirect Annuloplasty



CARILLON Mitral Contour System



Cardioband TRANS FEMORAL



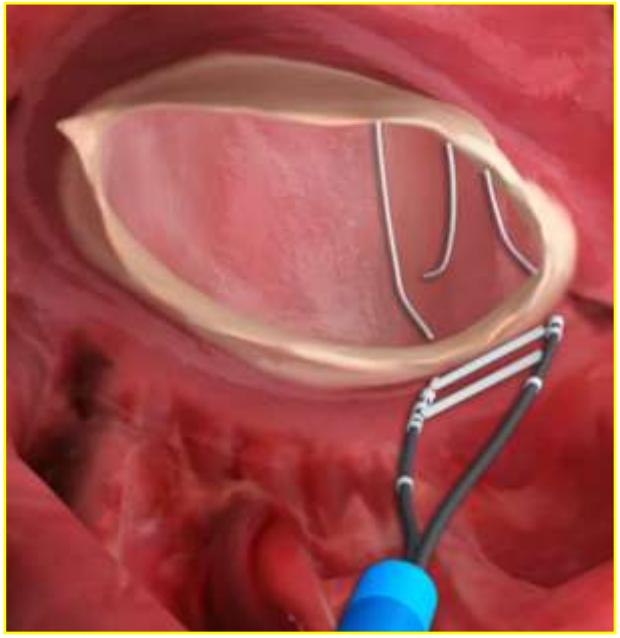
NorthShore University HealthSystem
Evanston Hospital

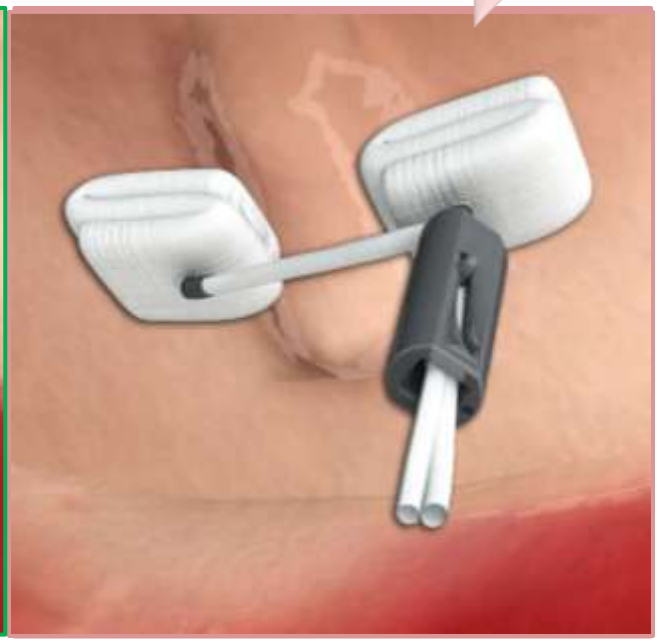
DIRECT ANNULOPLASTY
Mitralign Procedure Steps

Wire Delivery

Pledget Delivery

Plication & Lock

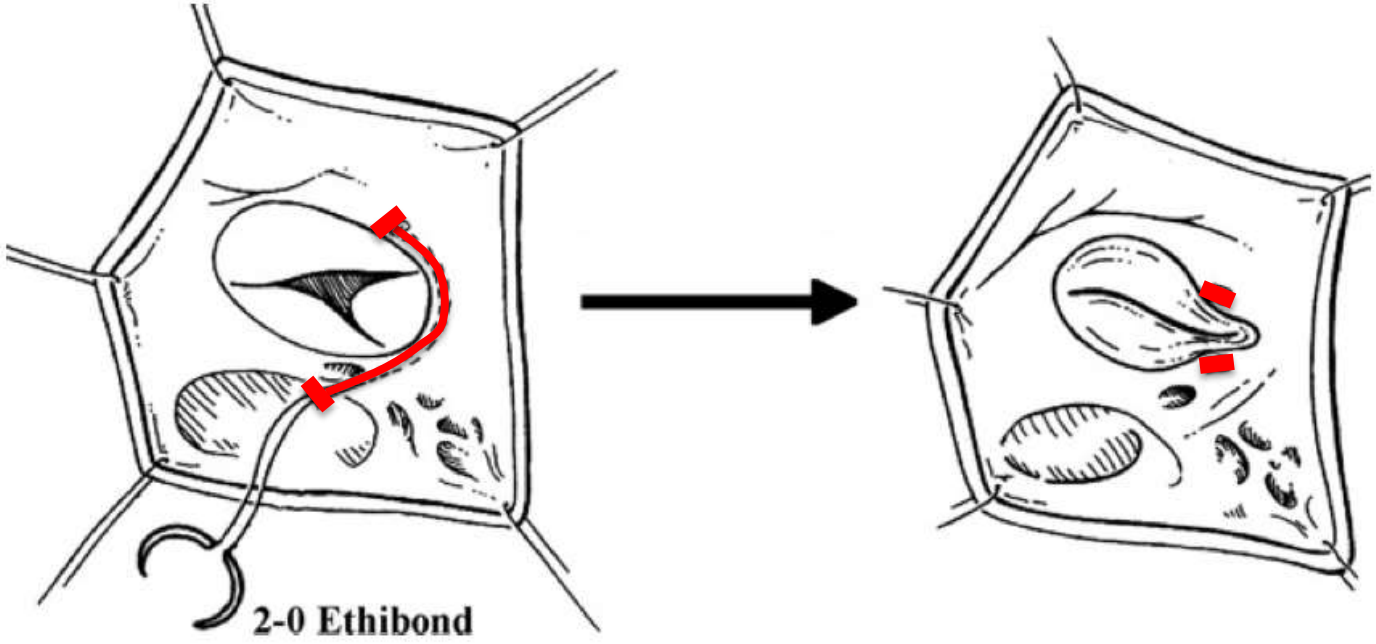




NorthShore University HealthSystem
Evanston Hospital

Suture bicuspidization of the tricuspid valve vs ring annuloplasty for functional tricuspid regurgitation

Midterm results of 237 consecutive patients



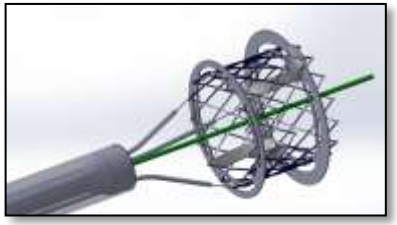
Suture bicuspidization is performed by placement of a 2-0 pledget-supported mattress suture from the antero-posterior to the posteroseptal commissures along the posterior annulus.

NorthShore University HealthSystem
Evanston Hospital

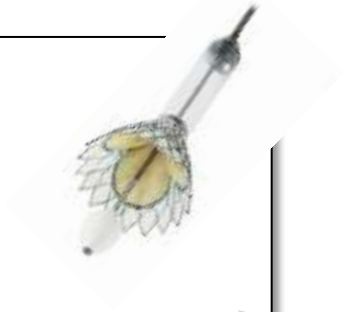
J Thorac Cardiovasc Surg 2007;133:117-126

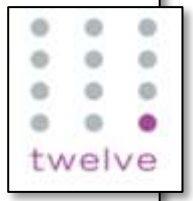
Mitral Replacement Technologies

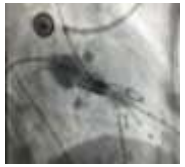
- CardiaAQ
- Neovasc TIARA
- Tendyne
- Edwards FORTIS
- Endovalve
- M-Valve
- Medtronic



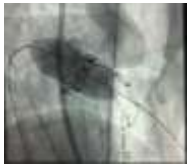
- Valtech
- Lutter
- MitrAssist
- Caisson
- MitraSeal
- Twelve
- HighLife
- Others….







The MITRAL Trial



Mitral **I**mplantation of **TRA**nscatheter va**L**ves in native mitral stenosis

The safety and feasibility of the SAPIEN XT TM Transcatheter Heart Valve with NovaFlex and Ascendra delivery systems in patients with symptomatic severe calcific mitral stenosis who are not candidates for mitral valve Surgery

- Cedars-Sinai Medical Center (Co- Principal Investigators: Saibal Kar, MD; Rajendra Makkar, MD)
- Columbia University (Co-Principal investigators: Susheel Kodali, MD; Martin Leon, MD)
- Evanston Hospital (Co- Principal Investigators: Mayra Guerrero, MD; Ted Feldman, MD)
- Henry Ford Hospital (Principal investigator: William O'Neill, MD)
- Massachusetts General Hospital (Principal Investigator: Igor Palacios, MD)
- Mayo Clinic (Principal Investigator: Charanjit RIhal, MD)

Principal Investigator Mayra Guerrero, MD

NorthShore University HealthSystem
Evanston Hospital