STRUCTURAL HEART UPDATES

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Oct 5, 2019

CONFLICTS OF INTEREST

NONE RELEVANT TO THIS PRESENTATION

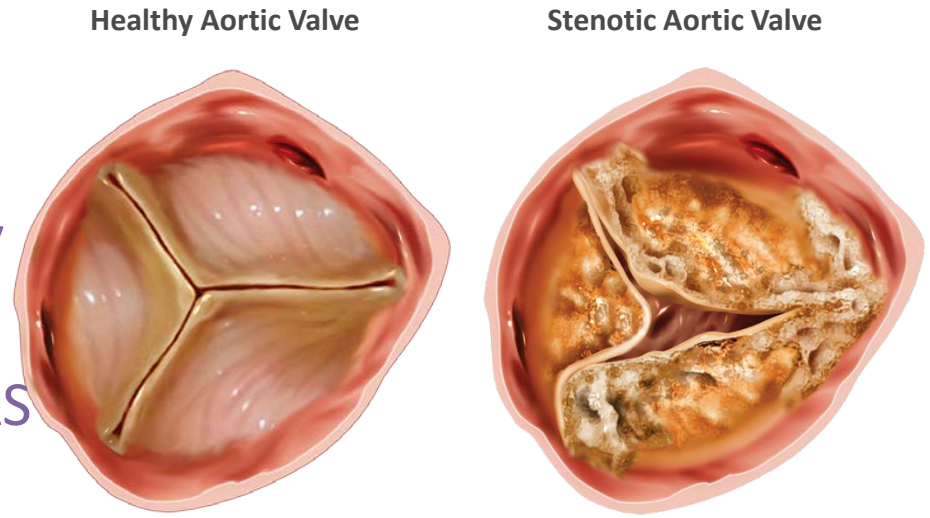
UPDATES IN STRUCTURAL HEART DISEASE

- **TAVR – Proven and Tested**
- **Mitral Clip and Role in Functional MR**
- **PFO Closure for Cryptogenic Stroke**

Etiology: Calcific Aortic Stenosis (AS)

Mechanism of Stenosis is Similar to Atherosclerosis[1]

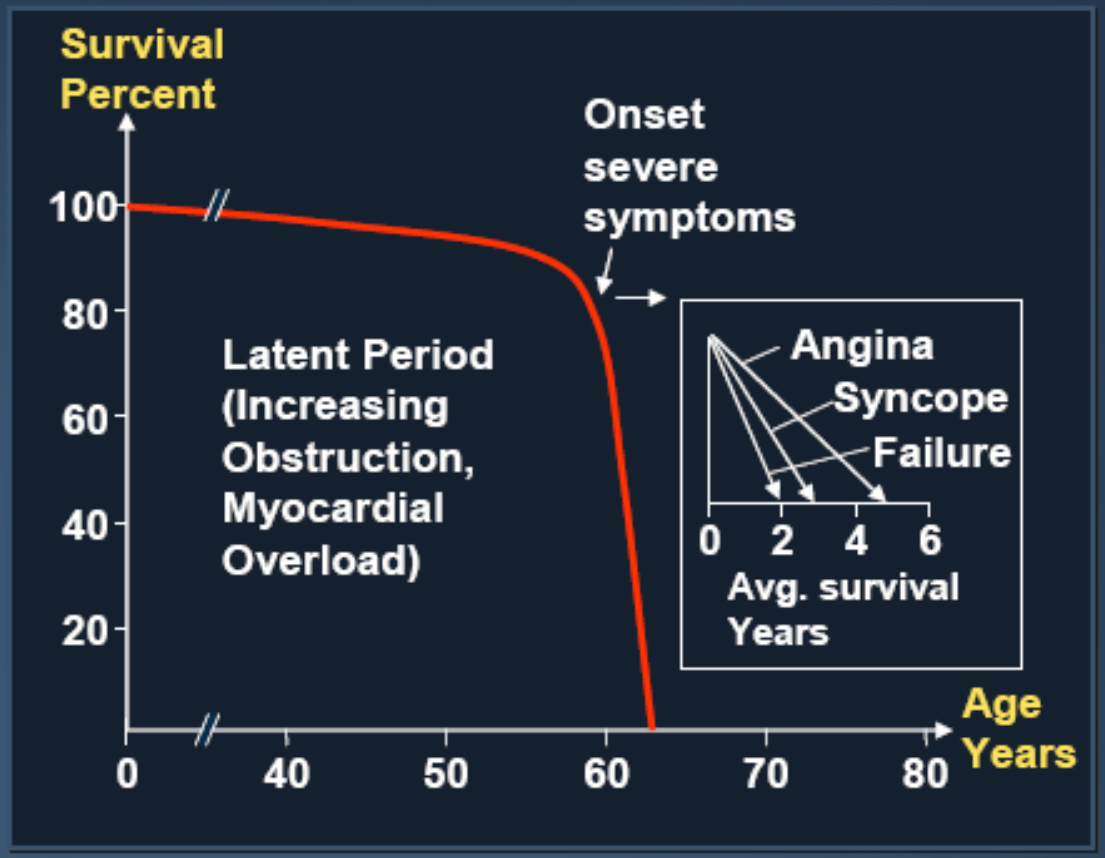
- Mainly solid calcium deposits within the valve cusps
- Similar risk factors to Coronary Artery Disease (CAD)
- High coincidence of CAD and AS in same individual[2]
- 6th, 7th, and 8th decades of life
- Calcific AS is leading cause of aortic valve replacement



1. Otto. *Circulation.* 1994;90:844-853.
2. Otto. *NEJM.* 1999;341:142-147.

Aortic Stenosis is Life-Threatening and Progresses Rapidly

Treatment Options and Timing Matter



"Survival after onset of symptoms is 50% at two years and 20% at five years."[1]

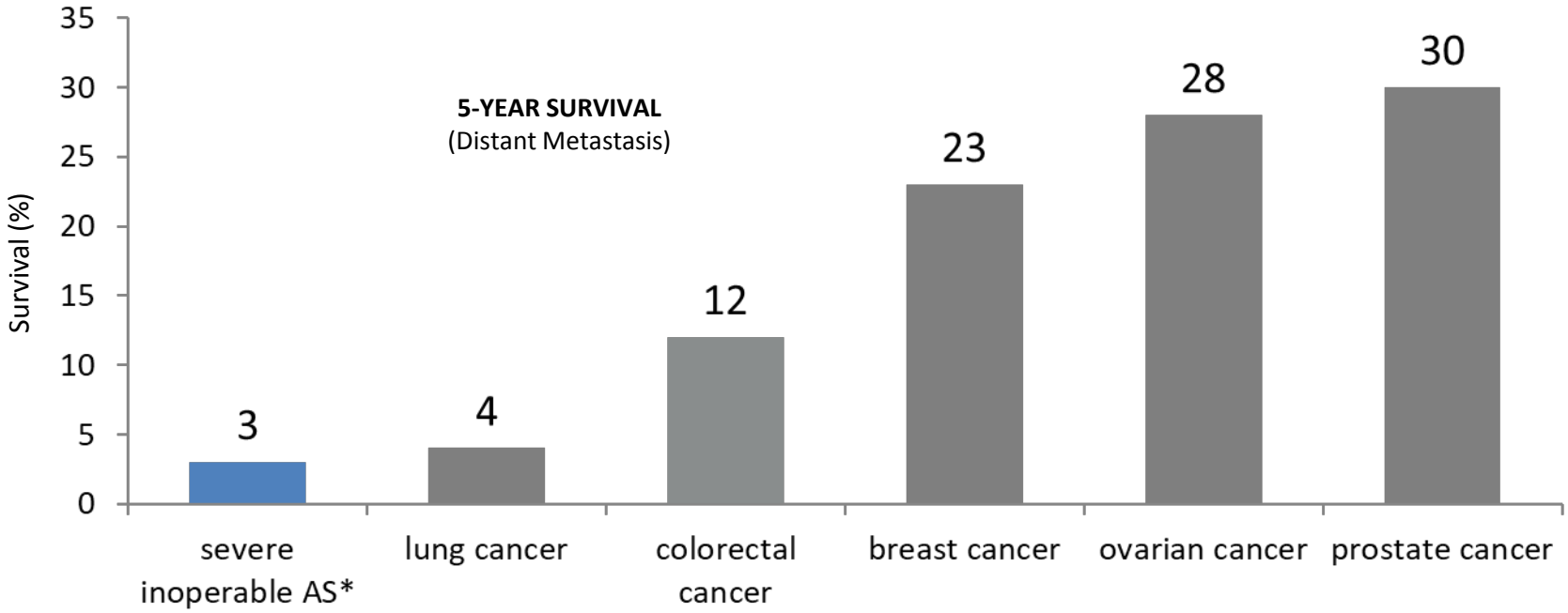
"Surgical intervention [for severe AS] should be performed promptly once even … minor symptoms occur."[2]

Sources: [1] S.J. Lester et al., "The Natural History and Rate of Progression of Aortic Stenosis," *Chest* 1998
[2] C.M. Otto, "Valve Disease: Timing of Aortic Valve Surgery," *Heart* 2000
Chart: Ross J Jr, Braunwald E. Aortic stenosis. *Circulation*. 1968;38 (Suppl 1):61-7.

CARDIOVASCULAR RESEARCH FOUNDATION

COLUMBIA UNIVERSITY MEDICAL CENTER

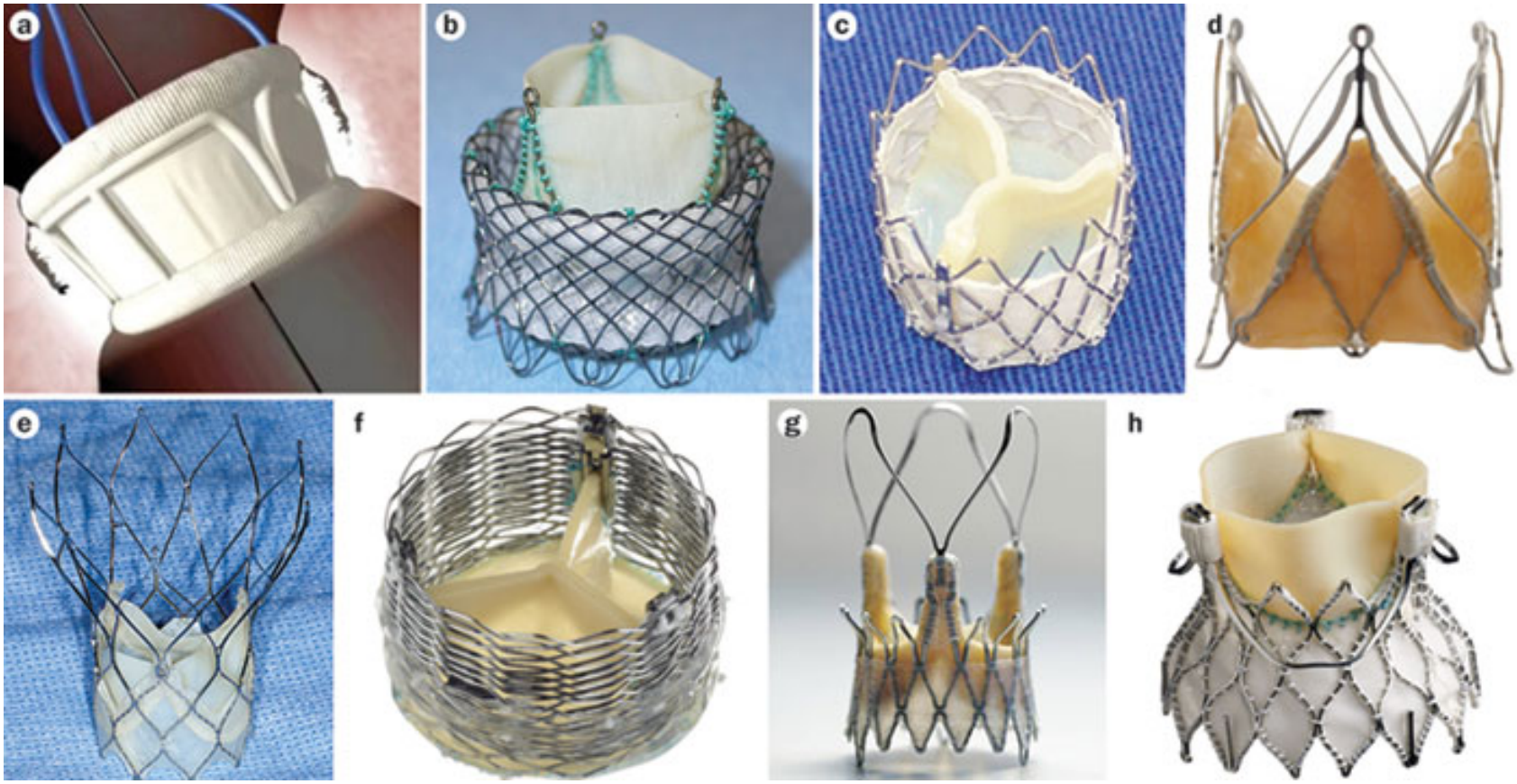
A SOBERING PERSPECTIVE



5-year survival of breast cancer, lung cancer, prostate cancer, ovarian cancer and severe inoperable aortic stenosis

*Using constant hazard ratio. Data on file, Edwards Lifesciences LLC. Analysis courtesy of Murat Tuczu, MD, Cleveland Clinic

Types of Transcatheter Aortic Valves



a- Direct Flow Medical, b- Heart Leaflet Technologies, c- Innovare, d- Jena Valve, e- Portico, f- Sadra, g- Symetis, h- Engager

TAVR MARKET LEADERS

1. Sapien – Edwards
2. Corevalve – Medtronic
3. Lotus – Bos Sci

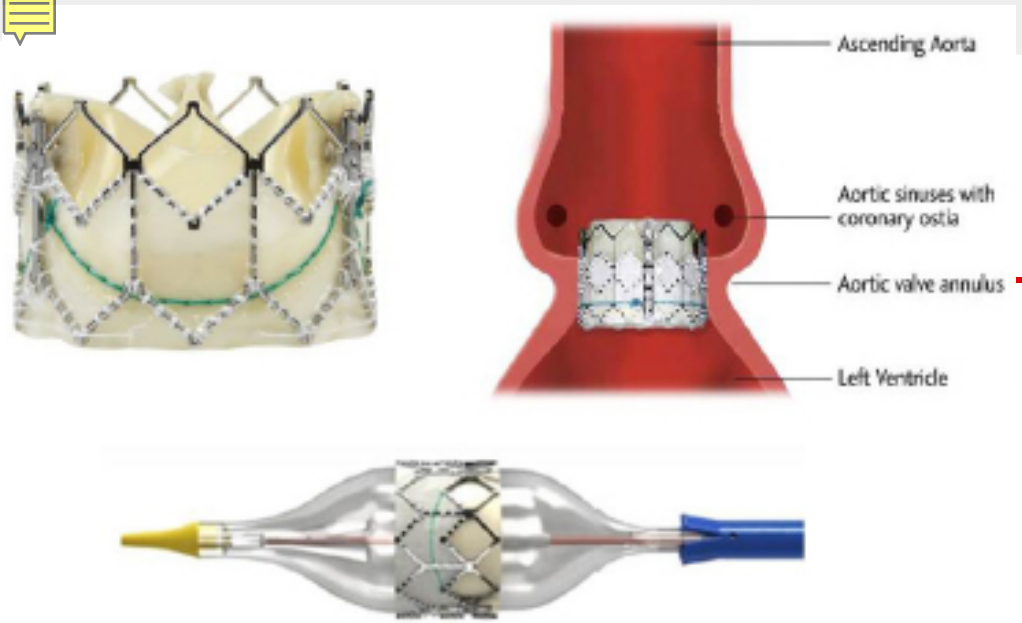


Fig 2. Sapien valve

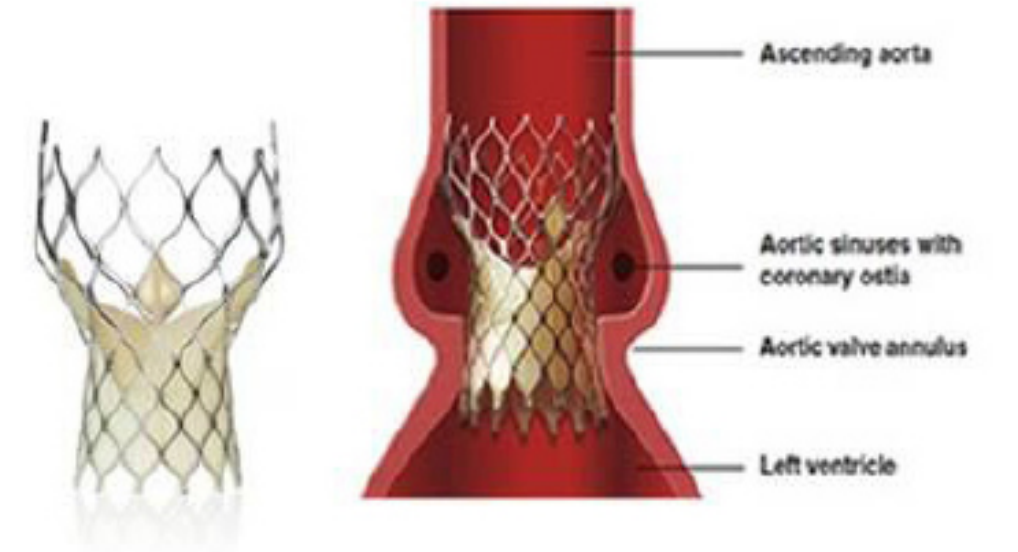
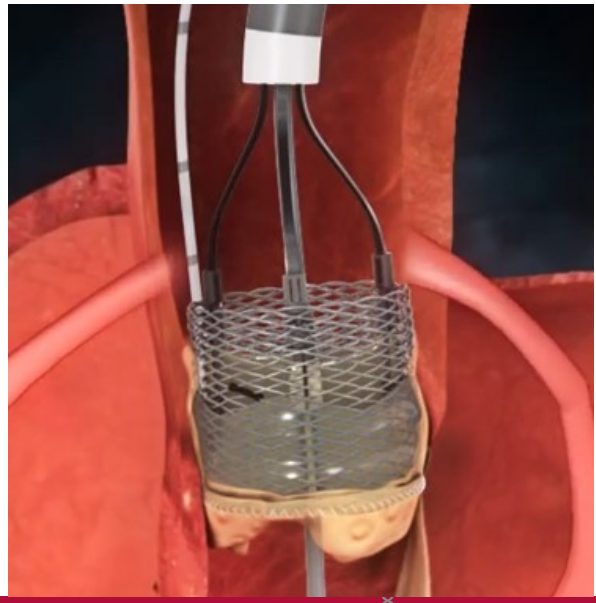
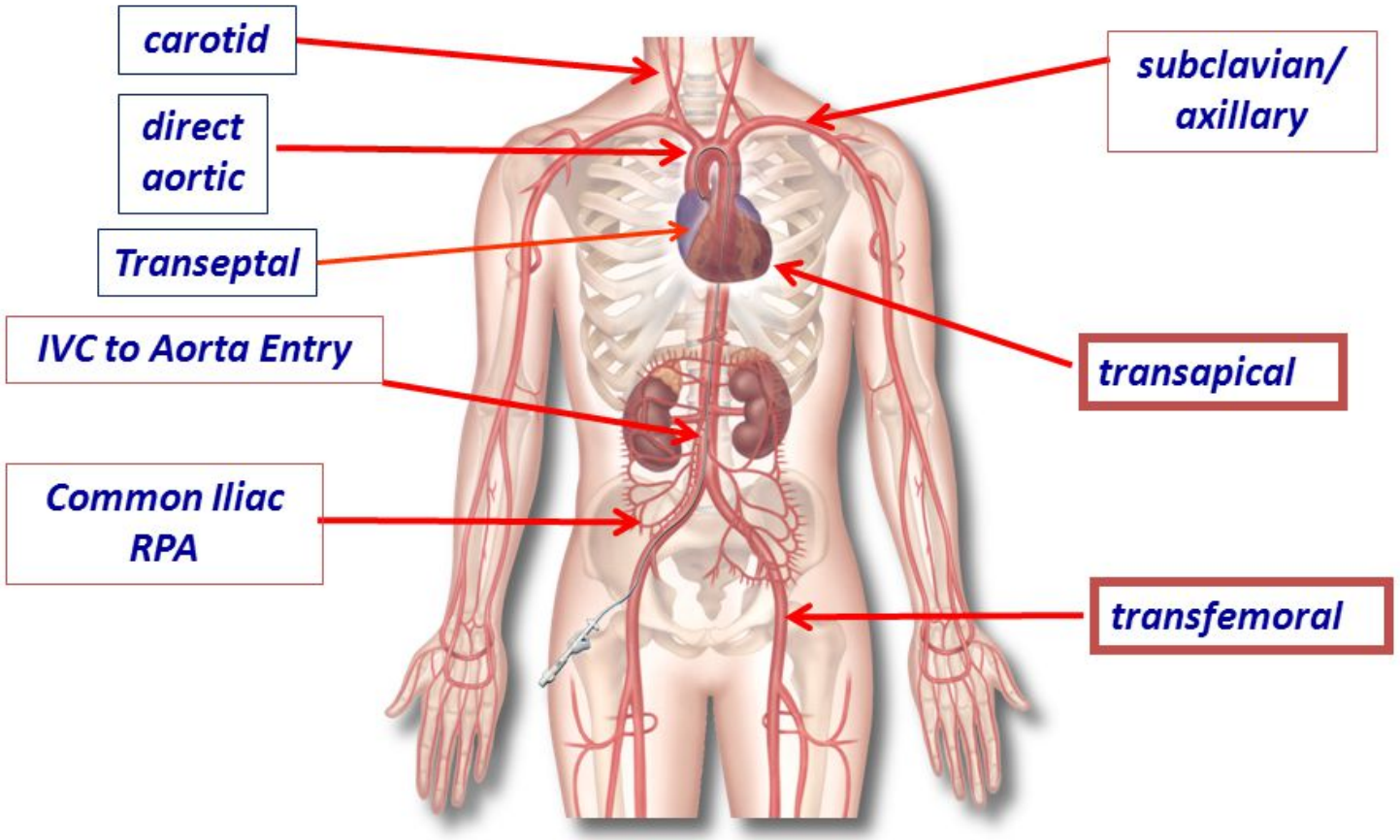


Fig 3. CoreValve

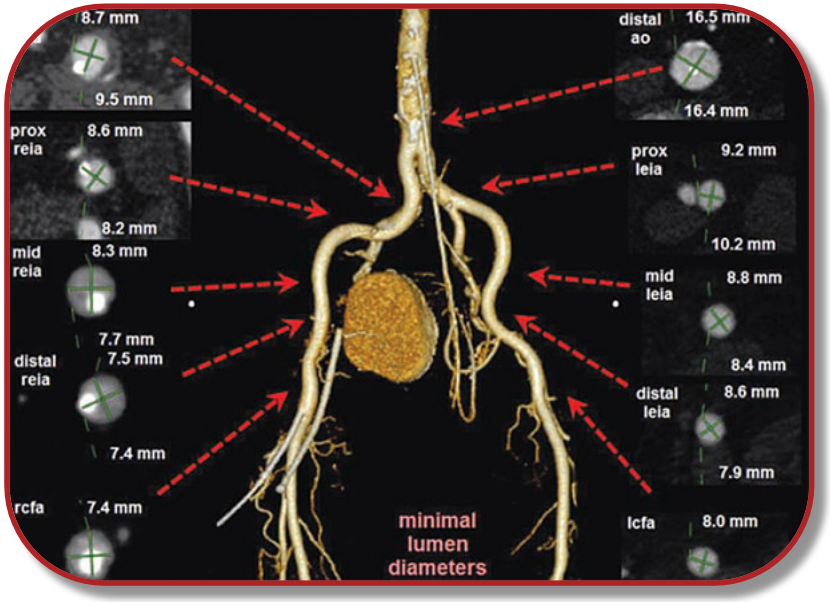


TAVR – ACCESS STRATEGIES

Multiple Options for Vascular Access

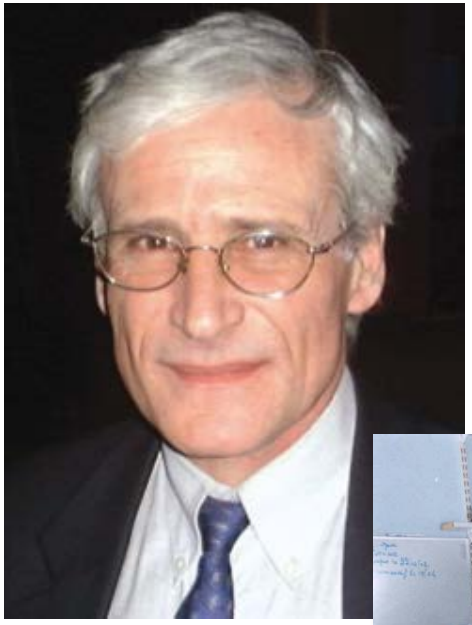


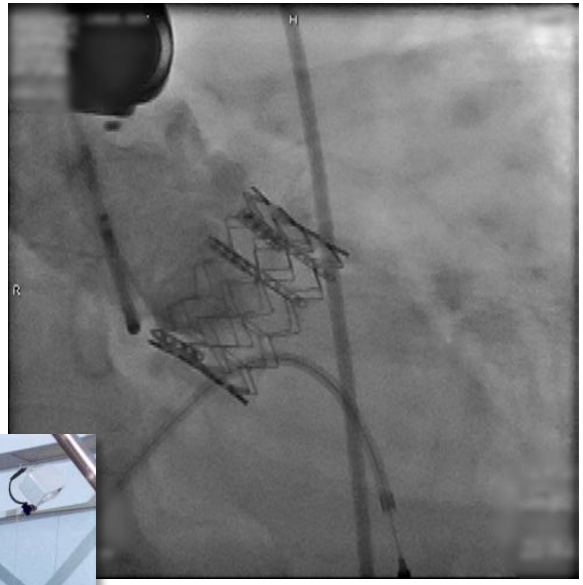
Femoral Access: Lower Profile – Lesser Complications

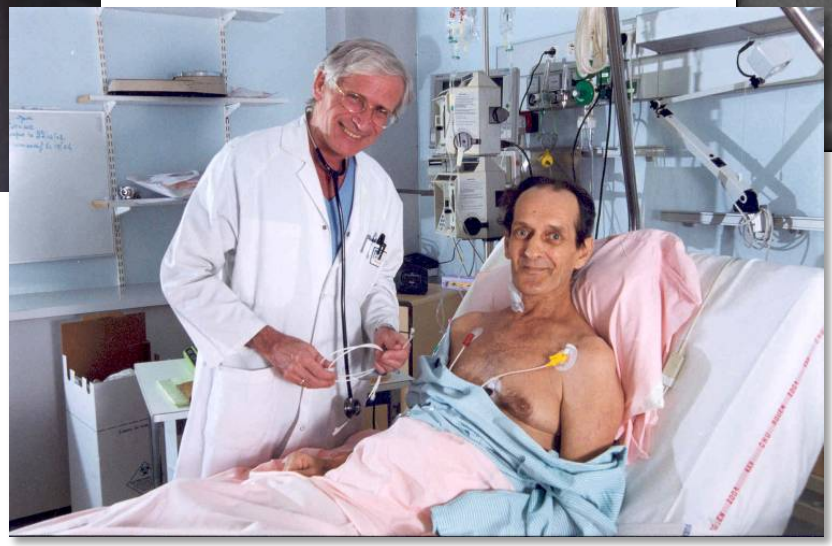


- ≥ 8 mm for a 26 mm valve (24F RetroFlex 3 sheath) – SAPIEN
- ≥ 6 mm for a 23-29 mm valve (16-20F NovaFlex sheath) – SAPIEN XT
- ≥ 6 mm for a 23-31 mm valve (18F Gore Dryseal sheath) – COREVALVE
- ≥ 5.5 mm for a 23-29 mm valve (14-16F e-sheath Edwards) – SAPIEN 3
- ≥ 5.5 mm for a 23-31 mm valve (14F InLine sheath) – COREVALVE EvolutR

Alain Cribier: First human TAVR (2002)

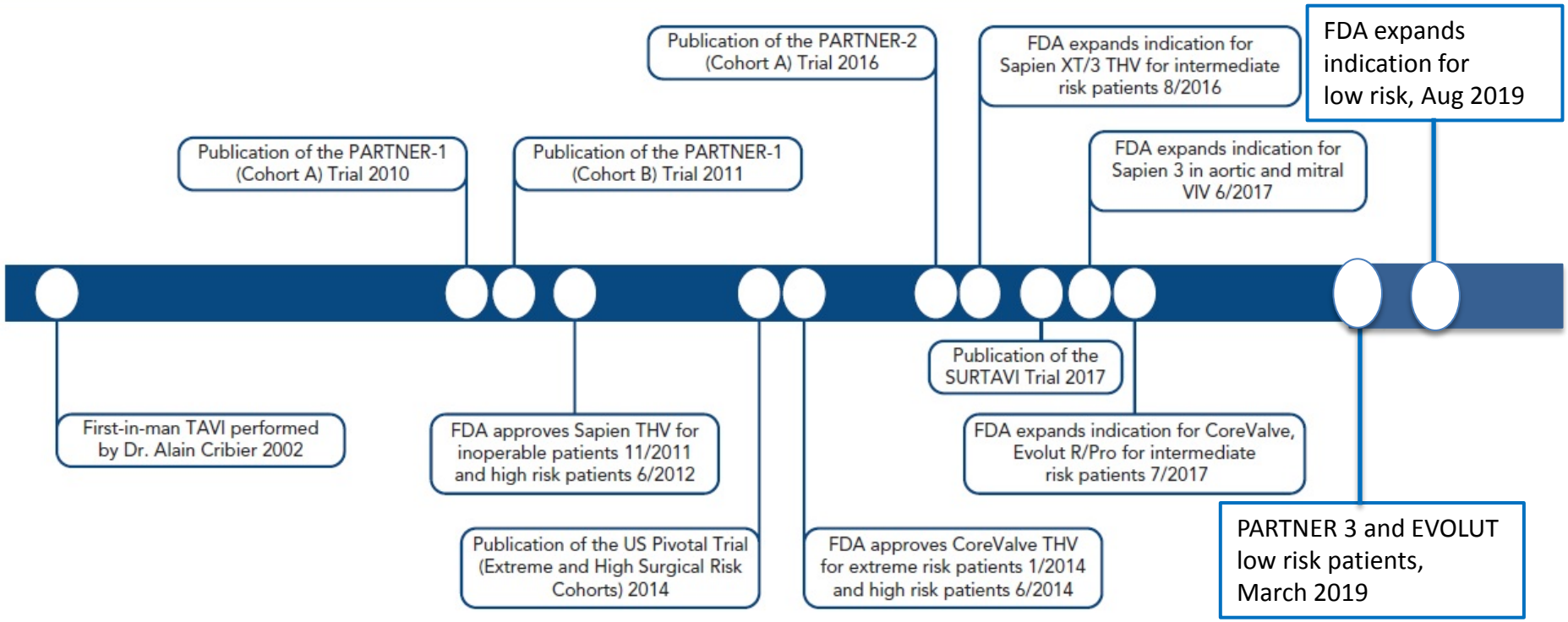






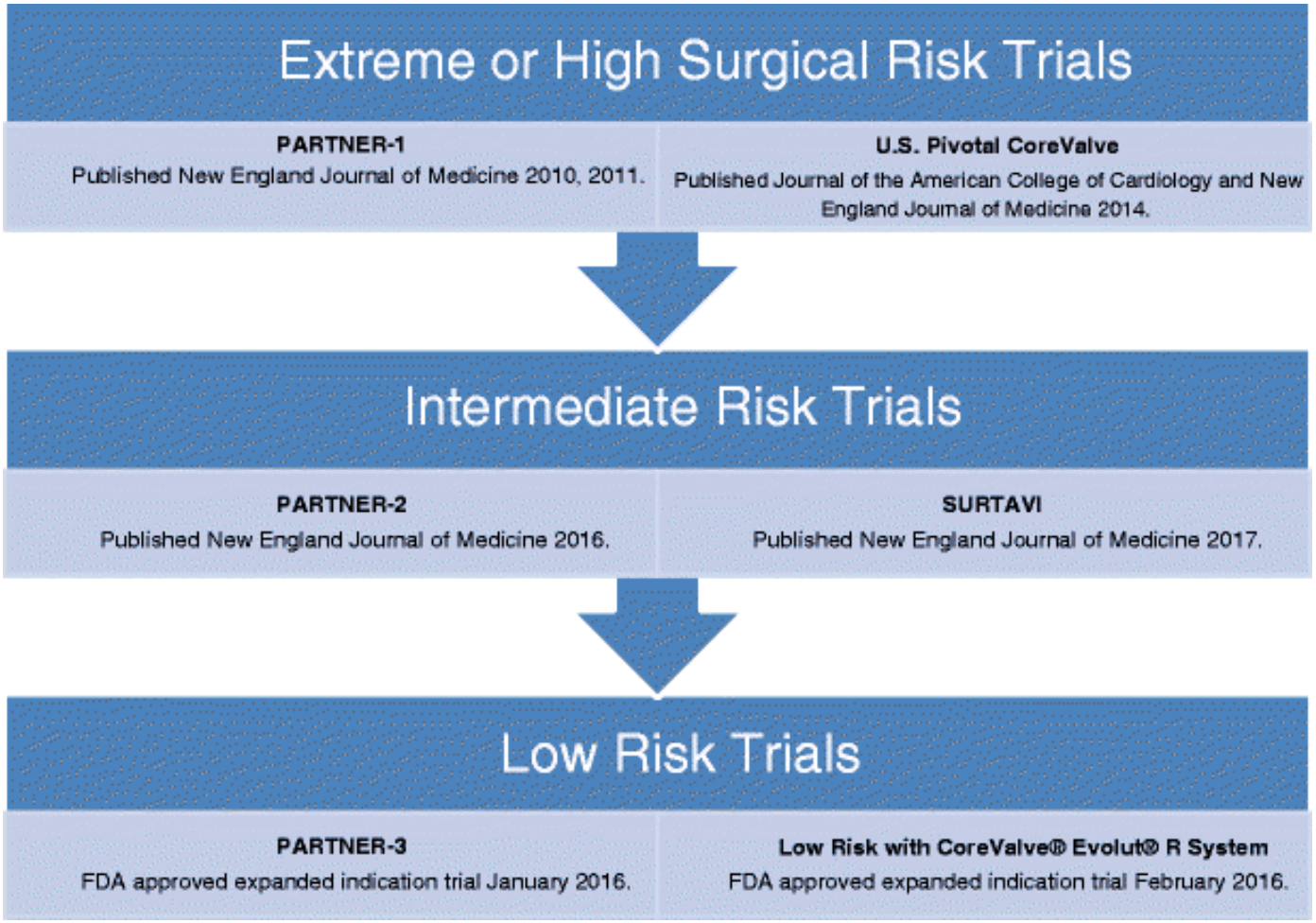
TAVR Global Timeline

Figure 2: Timeline of the Landmark TAVR Clinical Trials and Commercial Approval by the FDA



FDA = Food and Drug Administration; PARTNER = Placement Of Aortic Transcatheter Valves trial; TAVI = transcatheter aortic valve implantation; TAVR = transcatheter aortic valve replacement; THV = transcatheter heart valve.

AS Clinical Trials



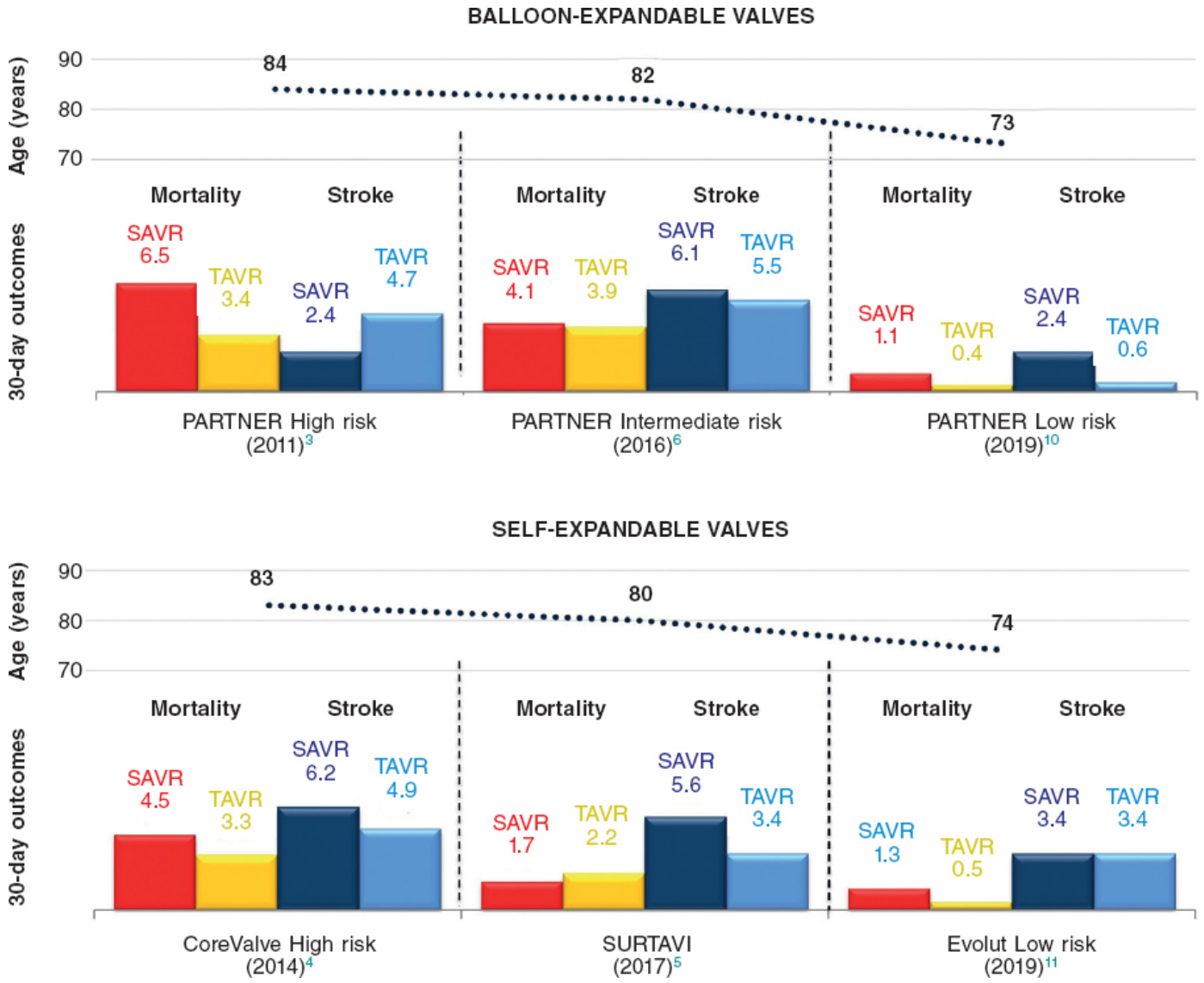
Surgical Risk Assessment

STS Score
(30 day Mortality)

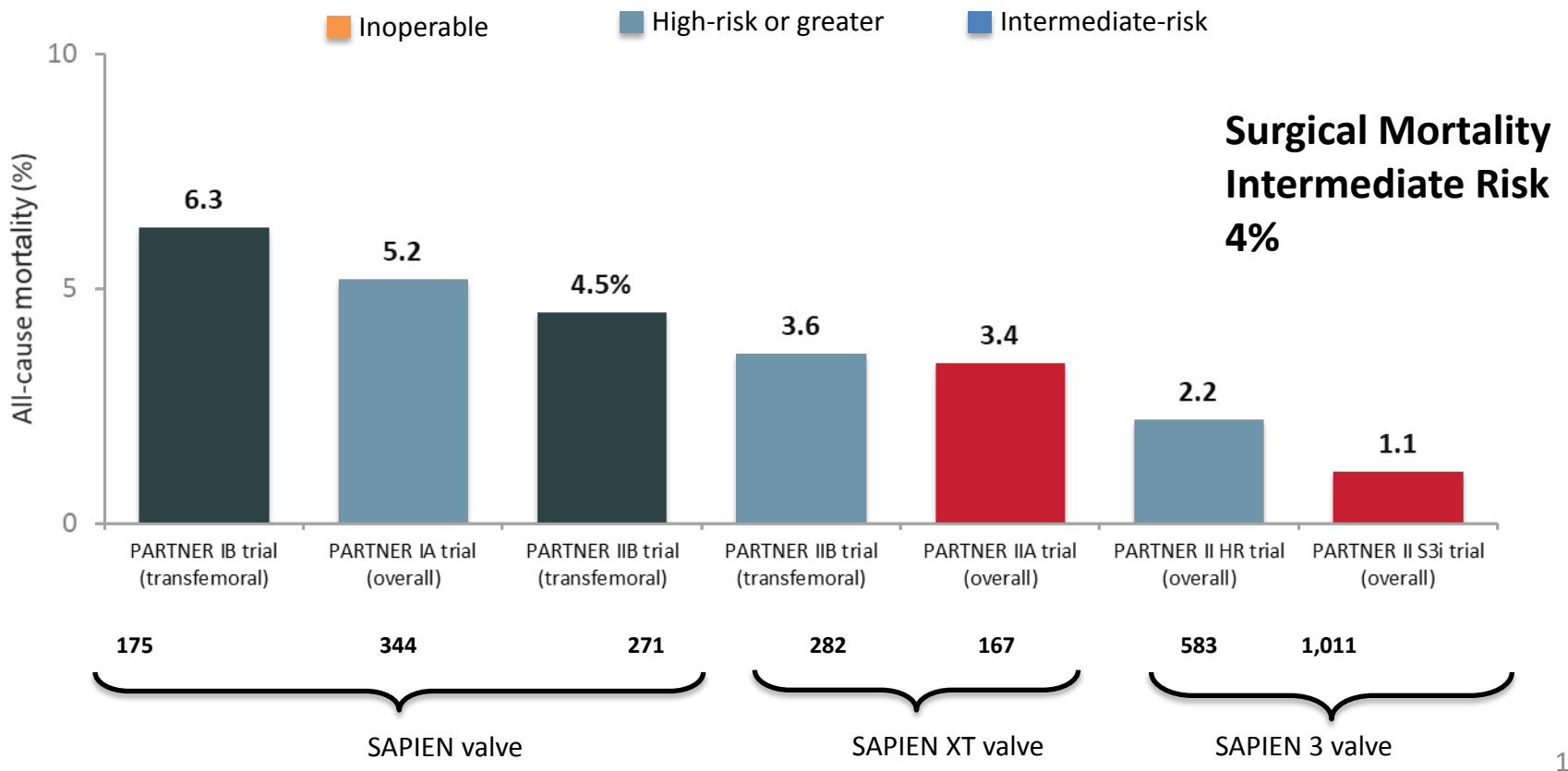
Low	**<4**
Intermediate	**4-8**
High	**8-15**
Extreme	**>15**

Low risk trial results were published in the New England Journal of Medicine March 2019.

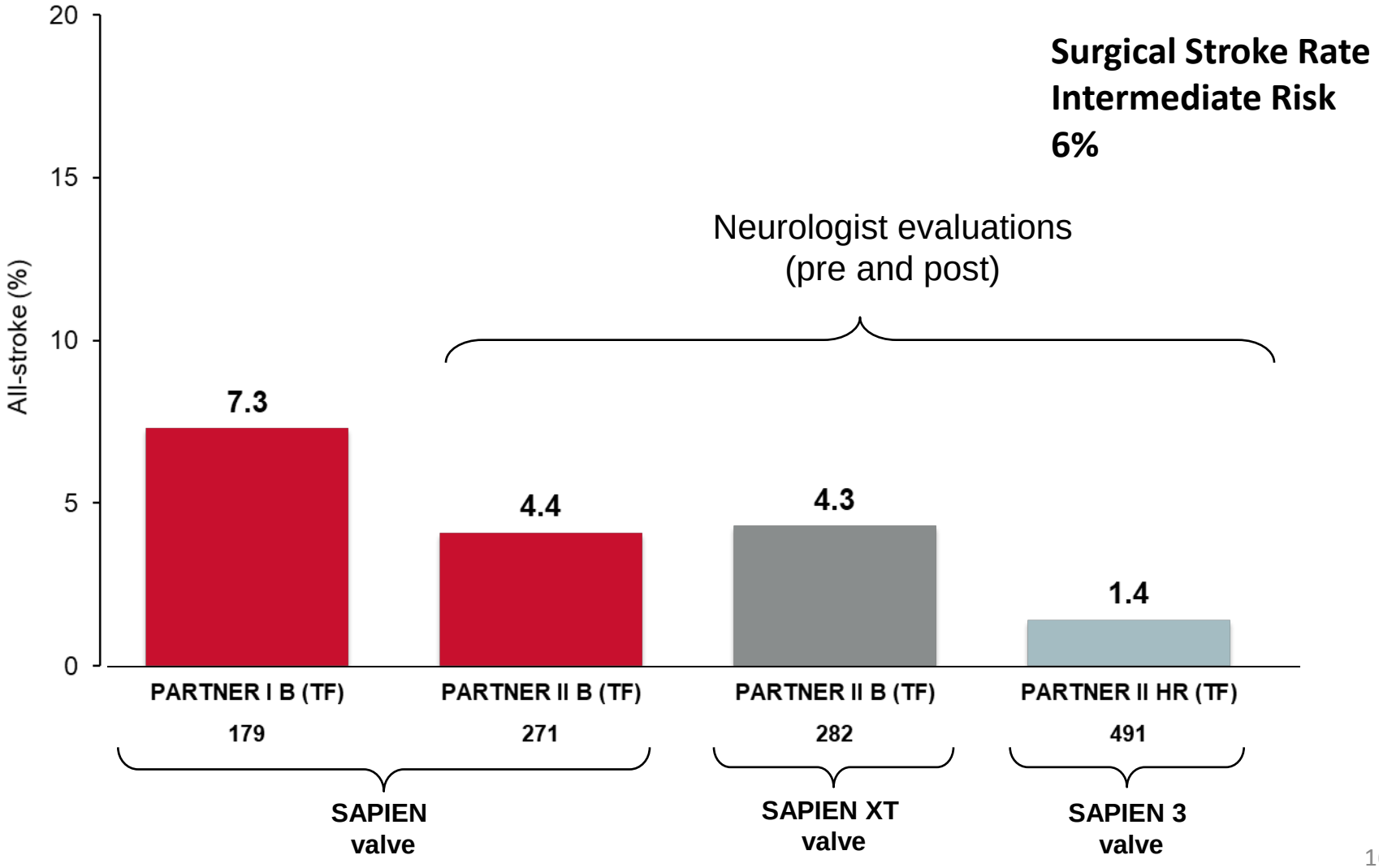
Summary of TAVR Clinical Trials



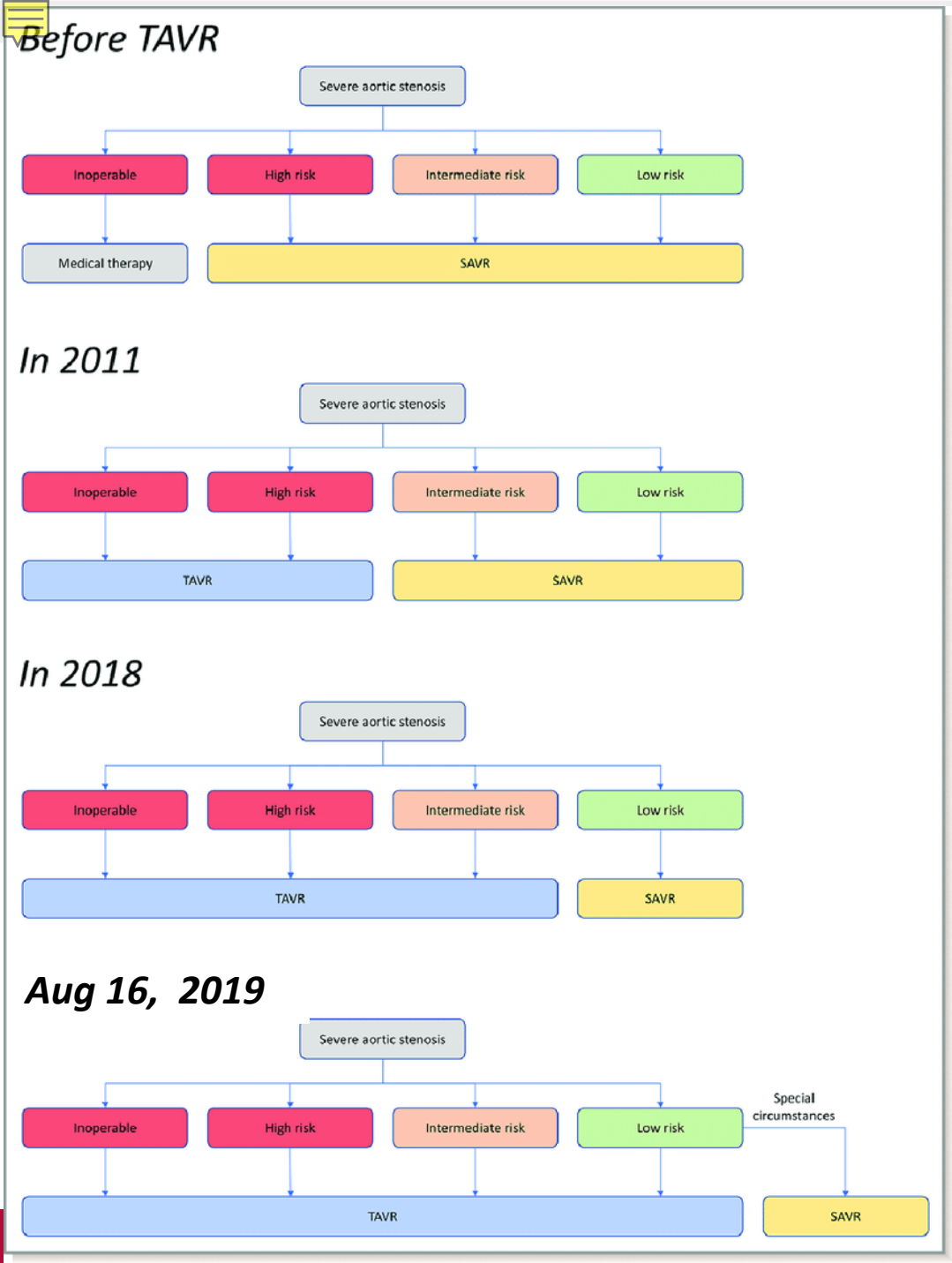
Mortality rates continue to decline



Stroke rates continue to decline



AS Management – Aug 16, 2019

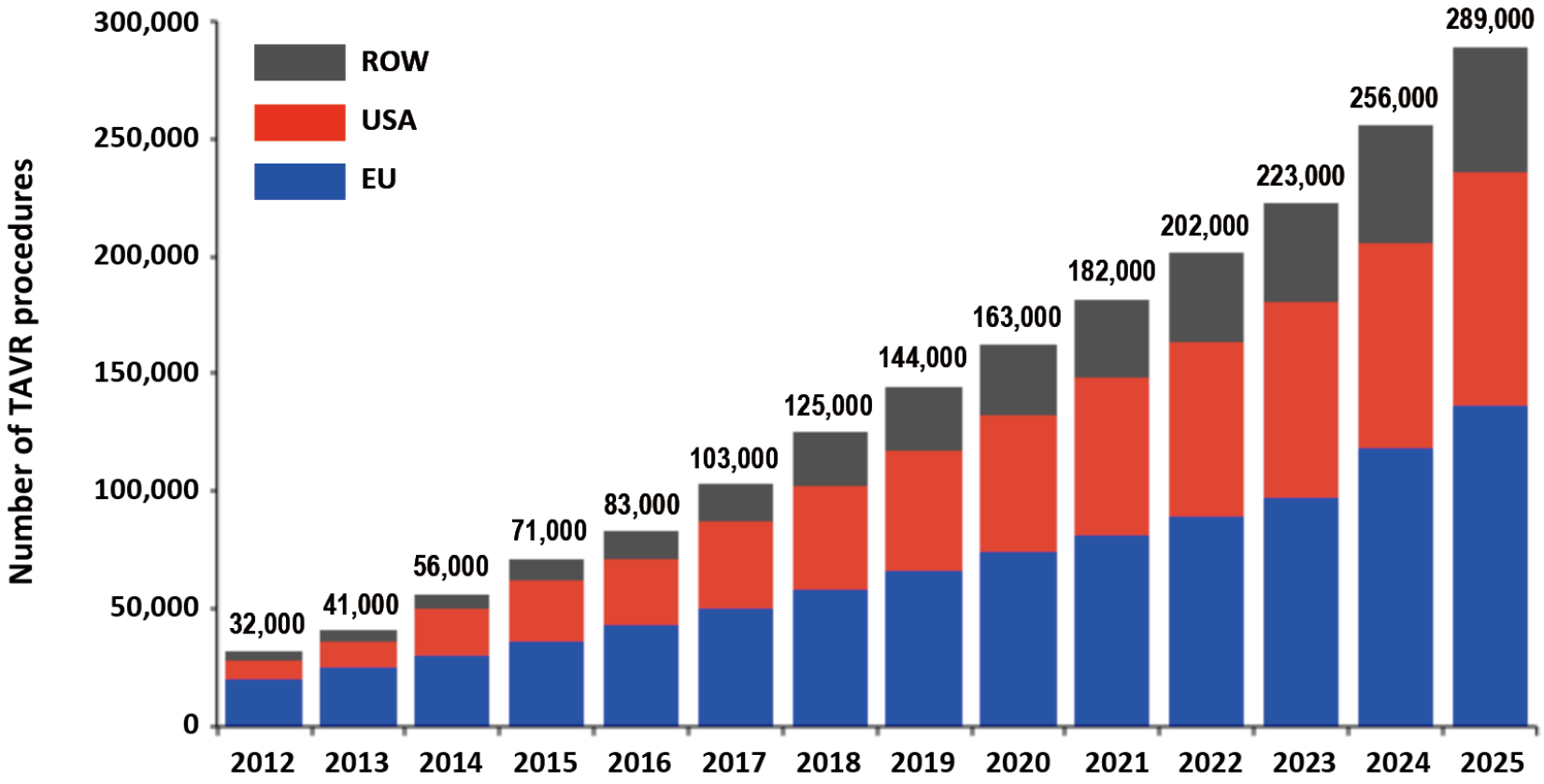


Indications for SAVR in Operable Patients

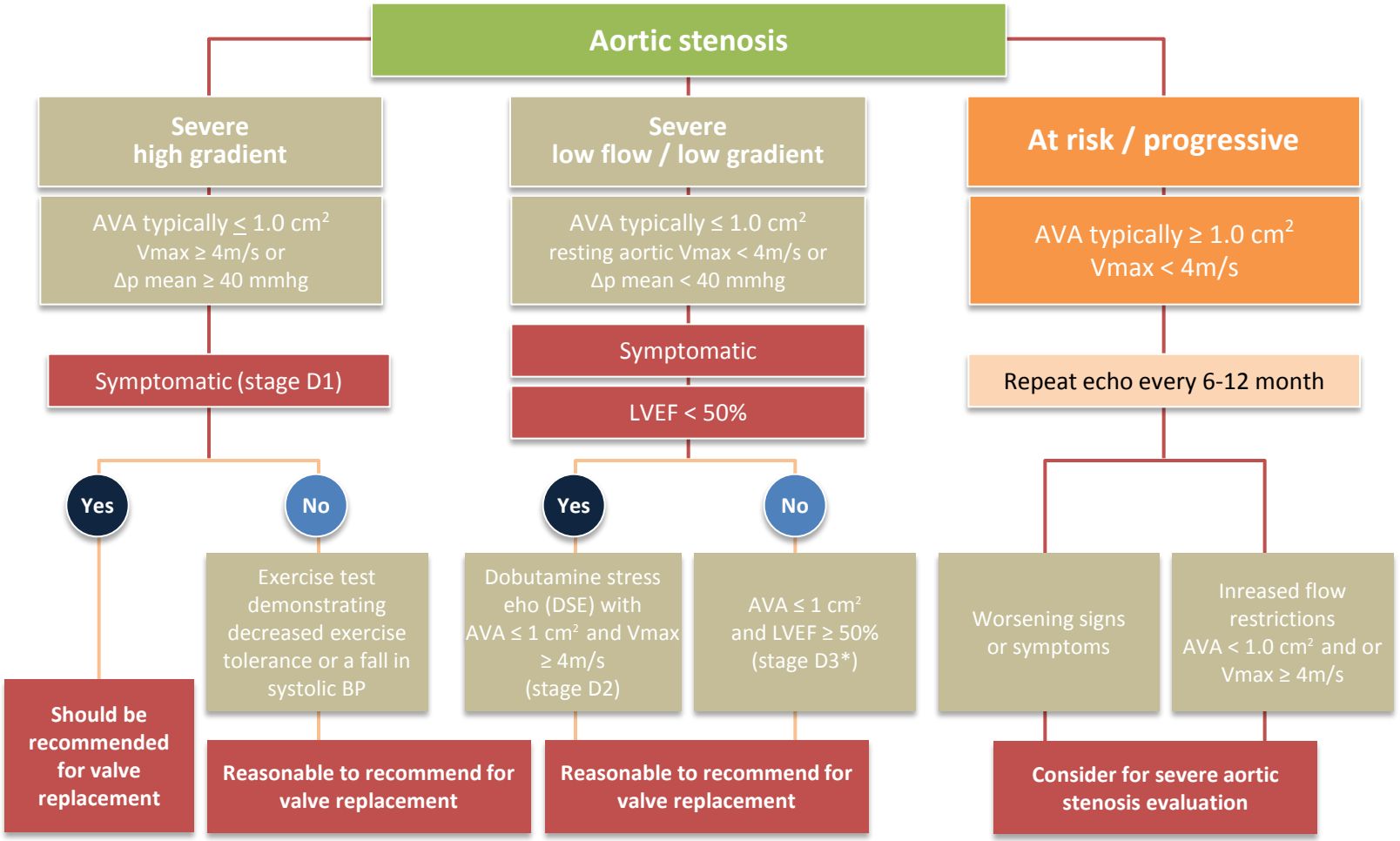
1. Young patient requiring a mechanical valve
2. Bicuspid aortic stenosis with dilation of the ascending aorta
3. Very large aortic annulus
4. Patients ineligible for transfemoral access
5. Aortic stenosis with multivessel coronary artery disease

Rogers T, Thourani VH, Waksman RJ
Am Heart Assoc. 2018 May 12;7(10). pii: e007147,

TAVR - WORLDWIDE GROWTH



AHA/ACC guidelines for aortic valve stenosis



*AVR should be considered with stage D3 AS only if valve obstruction is the most likely cause of symptoms, stroke volume index is < 35 mL/m², indexed AVA is ≤ 0.6 cm²/m² and data are recorded when the patient is normotensive (systolic BP< 140 mm Hg).

Technical Issues with Transcatheter Valves

- Aortic Insufficiency
- Coronary occlusion
- Heart block - Pacemaker rate 25 to 13%
- Root Rupture
- Pop out and Embolization
- Stroke – 7.5 to 2%
- Vascular Access and Complications
- Emergency Valve in Valve
- Suicide Ventricle

Future of Transcatheter Valves

- Indications
  - Bicuspid Valve
  - Asymptomatic Aortic stenosis.
  - Aortic Insufficiency

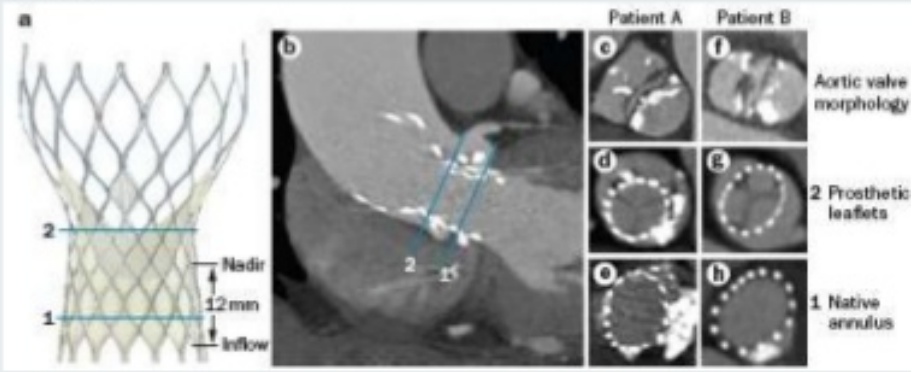
- Technology and Procedure Improvements
  - Lower profile valves and delivery systems
  - Retrievable Valves and Steerable delivery catheters
  - With conscious sedation and no general anesthesia
  - Cath lab instead of Hybrid OR
  - Cost reductions – currently each device US$ - 30,000

TAVR FOR BICUSPID AORTIC VALVE

Duke Heart Center

TAVR for BAV: Issues

- More oval & larger annulus
  - Potential for elliptical deployment with possible impaired durability
    - Less likely with balloon-expandable SAPIEN vs CoreValve



- Heavy & uneven leaflet calcification
  - Both may lead to more PVL
- Concomitant proximal (root/ascending) aortic pathology
  - **Not addressed by TAVR**
  - **More frequent angulated aorta with vertical annulus**
    - Challenge for correct positioning
  - **Also increased risk of device/procedure-induced aortic dissection**
    - Given frequent root dilation, coronary obstruction less likely
- Aortic insufficiency with non-calcified valve not well treated with TAVR

Aortic Valve in Valve

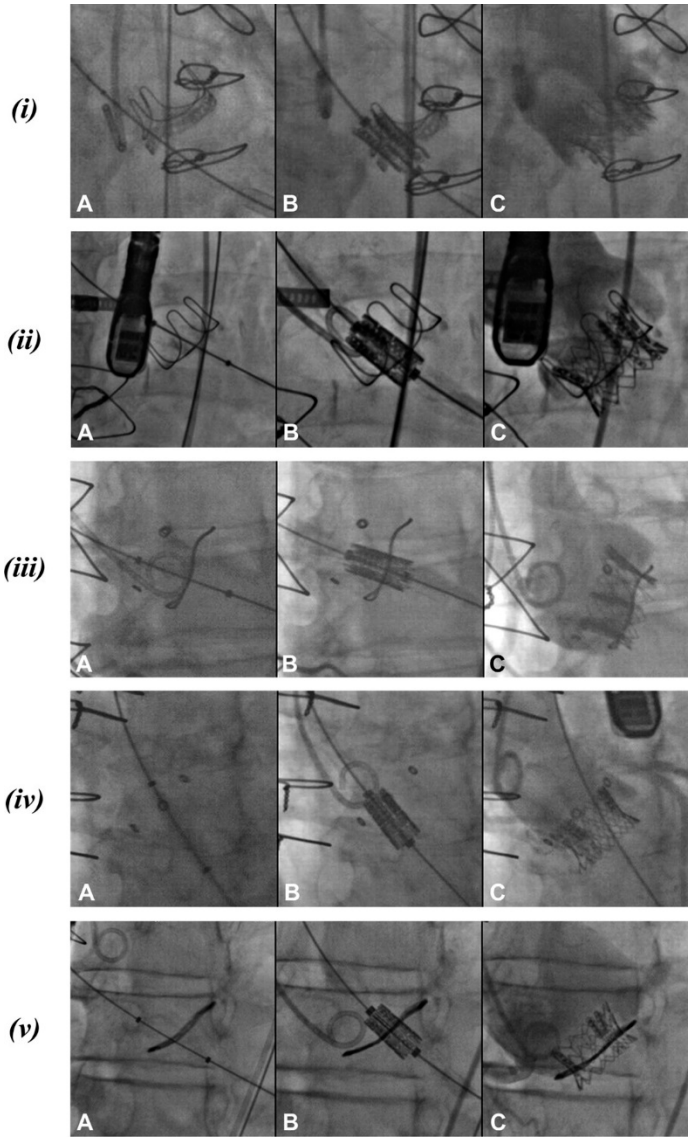
(i) 23-mm SAPIEN in 21-mm CE Perimount,

(ii) 26-mm SAPIEN in 25-mm CE Porcine,

(iii) 26-mm SAPIEN in 25-mm Hancock,

(iv) 23-mm SAPIEN in 21-mm Mosaic,

(v) 23-mm SAPIEN in 23-mm Mitroflow.



A, Orthogonal view before balloon valvuloplasty.

B, Valve positioning.

C, Final angiographic result.

Azadani A N , and Tseng E E *Circ Cardiovasc Interv*. 2011;4:621-628

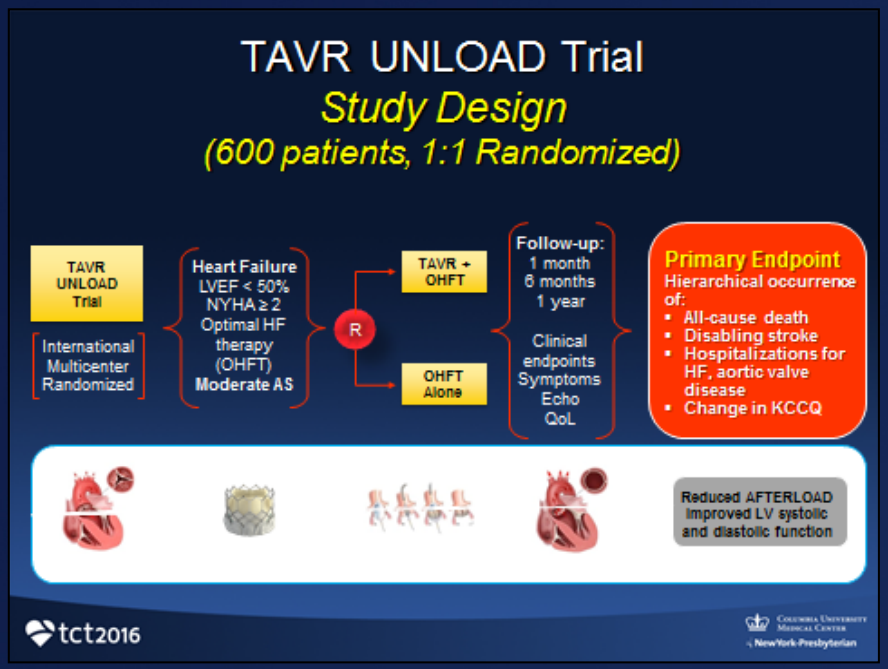
Earlier Intervention

Active Trials

There is interest in using TAVR to intervene earlier in the AS disease process to prevent inevitable myocardial damage and functional decline

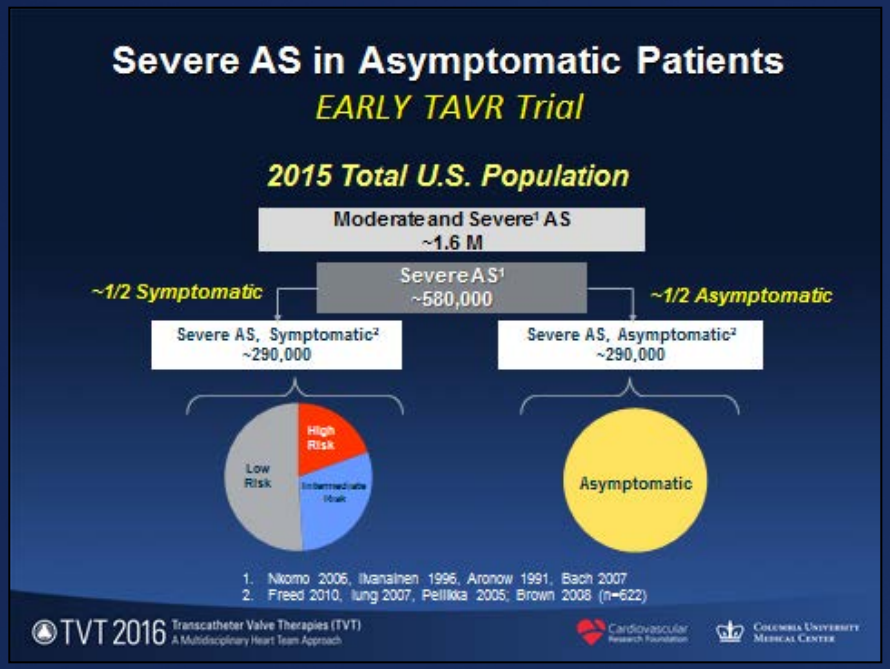
TAVR UNLOAD

TAVR will be compared to medical therapy in patients with moderate AS, symptoms of heart failure, and reduced EF



EARLY TAVR

TAVR will be applied to asymptomatic patients with severe AS



Who should be referred to the Valve Clinic?

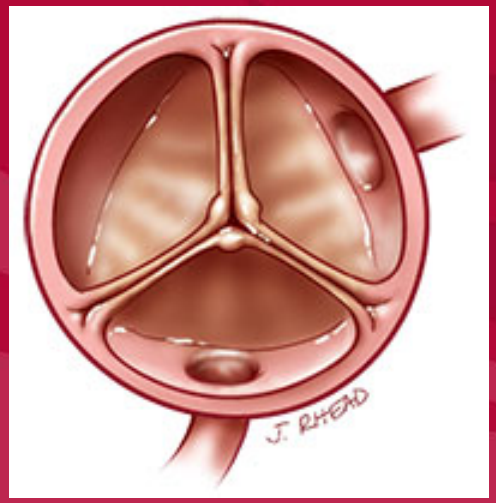
1. **Severe Aortic Stenosis – All comers – Extreme, High, Intermediate and Low Risk**
2. **Moderate MR with Afib**

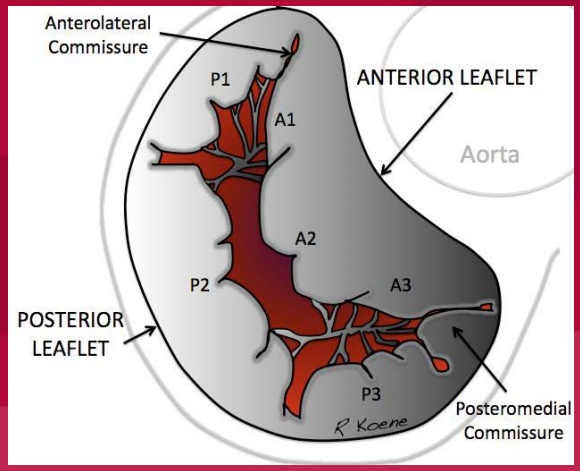
Scheduler

Nancy Mayhew 321 841 4324

MITRAL REGURGITATION

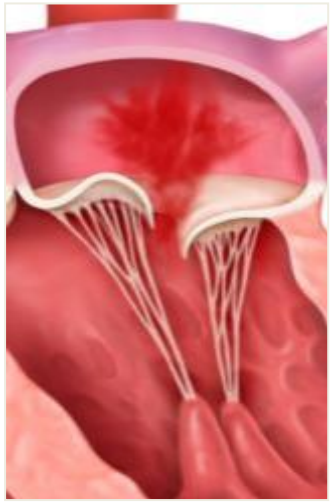
THE NEXT FRONTIER





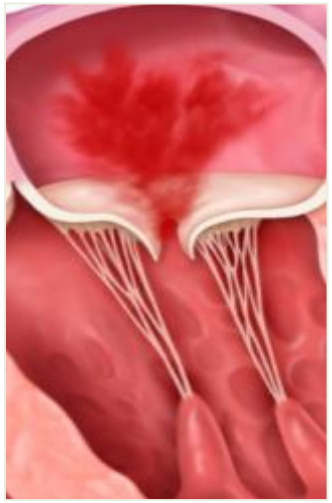
Mitral Regurgitation Etiologies

Normal
Mitral Valve



Degenerative
MR: Prolapse

Degenerative
MR: Flail



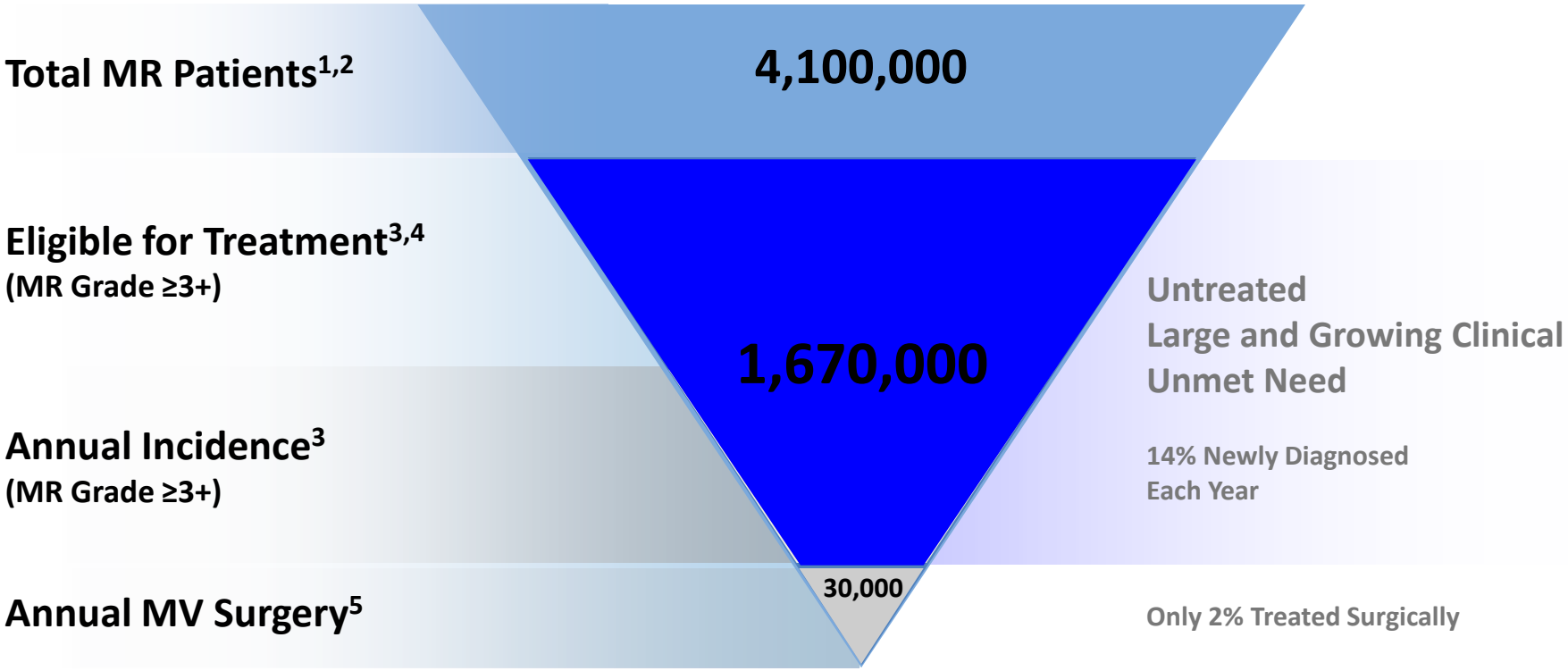
Functional MR

- **Structural MR is due to an anatomic abnormality of the mitral valve itself, including the leaflets, and/or the subvalvular apparatus.**
- **2 Million or 30%**

- **Functional MR is the result of left ventricular dilation leading to annular dilation and incomplete coaptation of the mitral valve leaflets.**
- **5 Million or 70%**

Mitral Regurgitation 2009 U.S. Prevalence

A Largely Untreated Patient Population



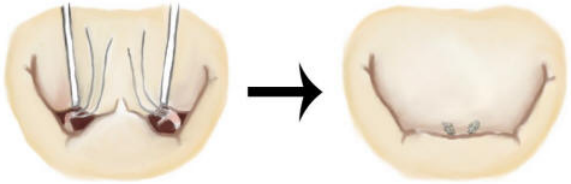
1. US Census Bureau. Statistical Abstract of the US: 2006, Table 12.
2. Nkomo et al. Burden of Valvular Heart Diseases: A Population-based Study, Lancet, 2006; 368: 1005-11.
3. Patel et al. Mitral Regurgitation in Patients with Advanced Systolic Heart Failure, J of Cardiac Failure, 2004.
4. ACC/AHA 2008 Guidelines for the Management of Patients with Valvular Heart Disease, Circulation: 2008
5. Gammie, J et al, Trends in Mitral Valve Surgery in the United States: Results from the STS Adult Cardiac Database, Annals of Thoracic Surgery 2010.

MR Treatment (Structural and Functional) : GDMT

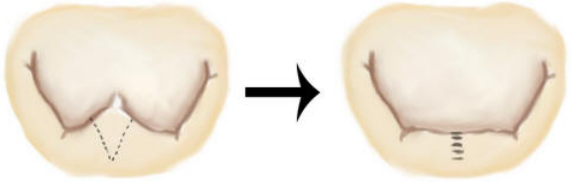
- **OPTIMIZE MEDICAL THERAPY:**
  - ACE/ARB
  - Afterload reduction with nitrates (oral) and antihypertensives (hydralazine)
  - Aldosterone Receptor antagonists, Neurohormonal antagonists – Eplerenone
  - Beta Blockers
  - Diuretics,
  - Neprilysin/ARB inhibitors – Sacubitril/Valsartan ?
  - Digoxin ?
- **RE-VASCULARIZATION-CABG, PCI**
- **BiV PACING**
- **A. Fib management / treatment**

Mitral Surgery: Replacement, Repair, Stitch

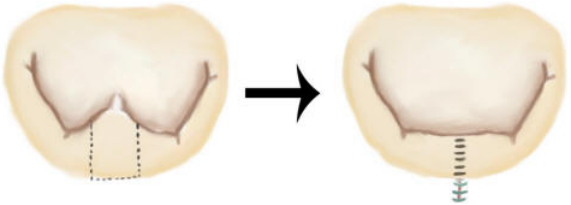
Neochordae



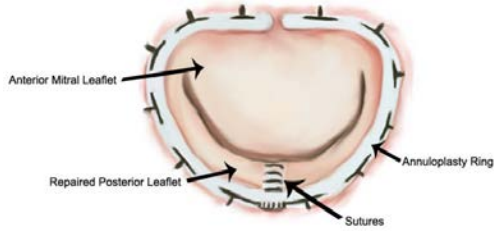
Triangular Resection



Quadrangular Resection

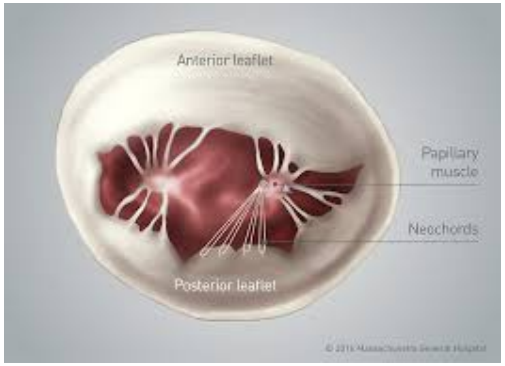


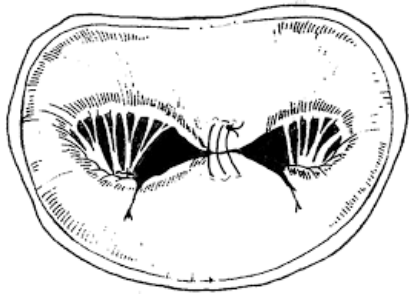
Completed Mitral Valve Repair



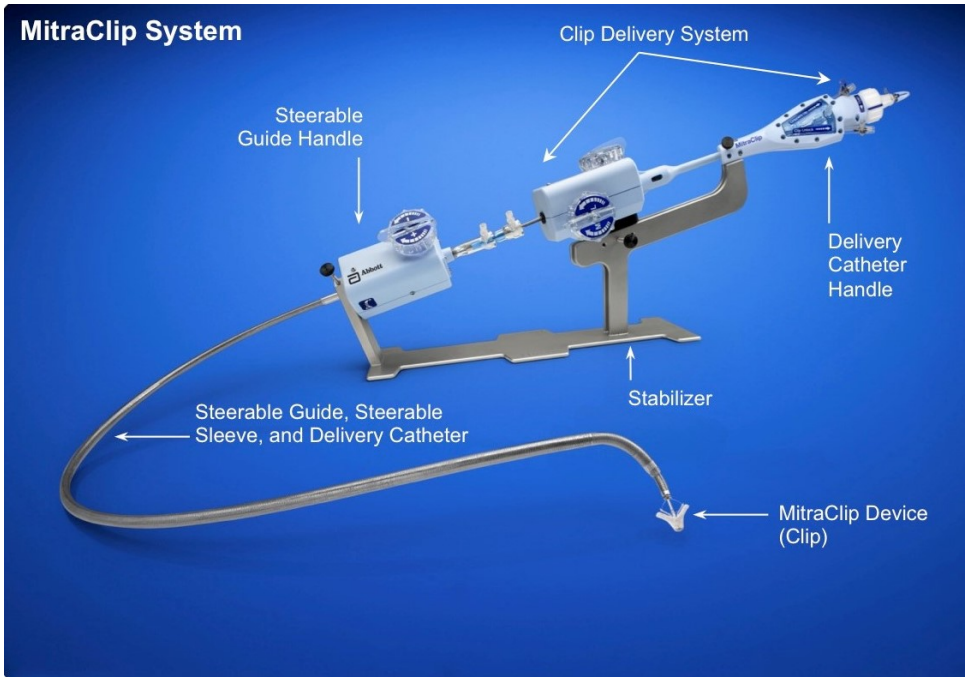
Biological valve (human or porcine)

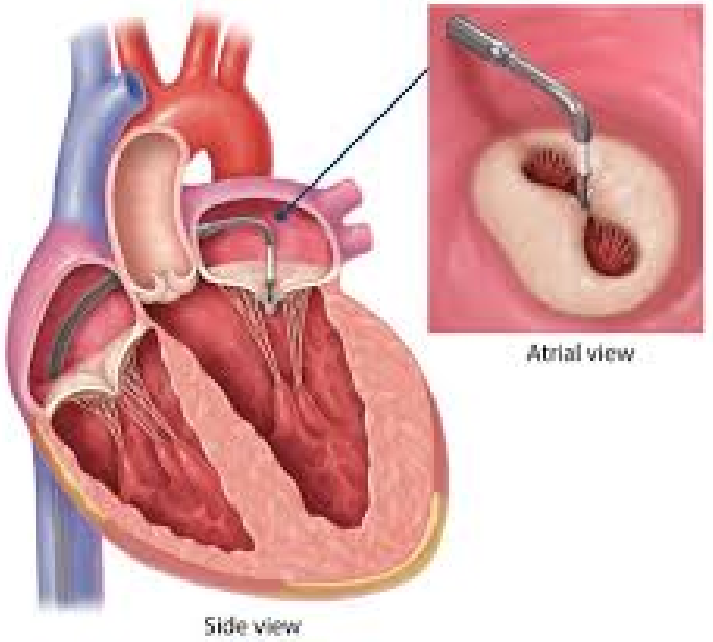
Mechanical valve

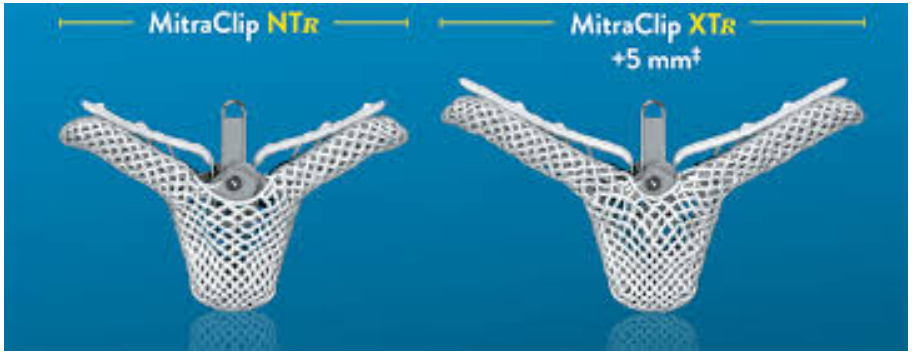




The MitraClip System







Mitraclip Indications

Significant symptomatic pre treatment MR >3+.

Reduction to MR<2+ is reasonably expected

Structural MR (Functional)

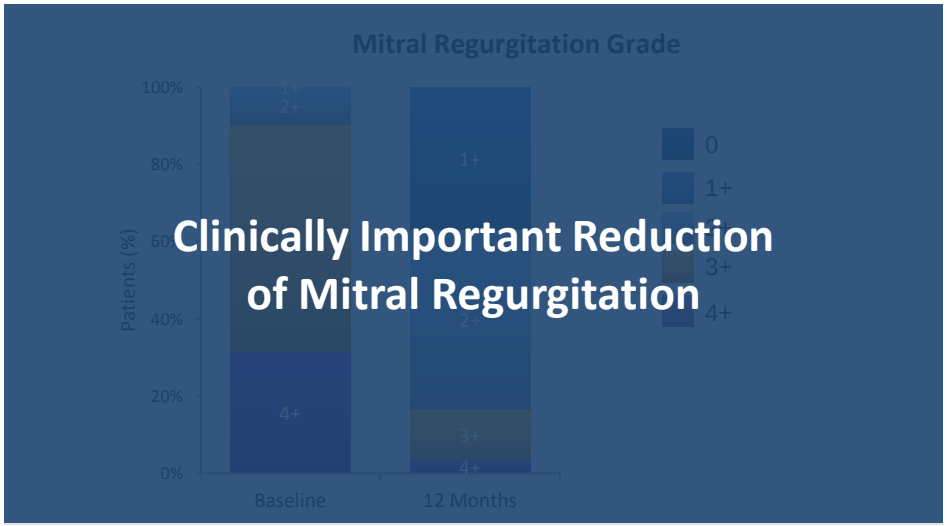
No severe co morbidities that would negate procedural benefits

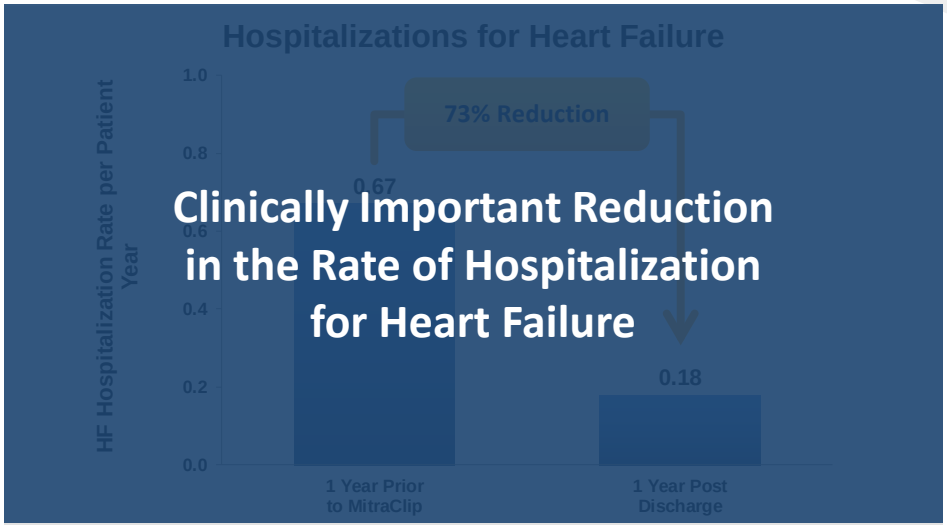
Prohibitive (High) risk for MV Surgery

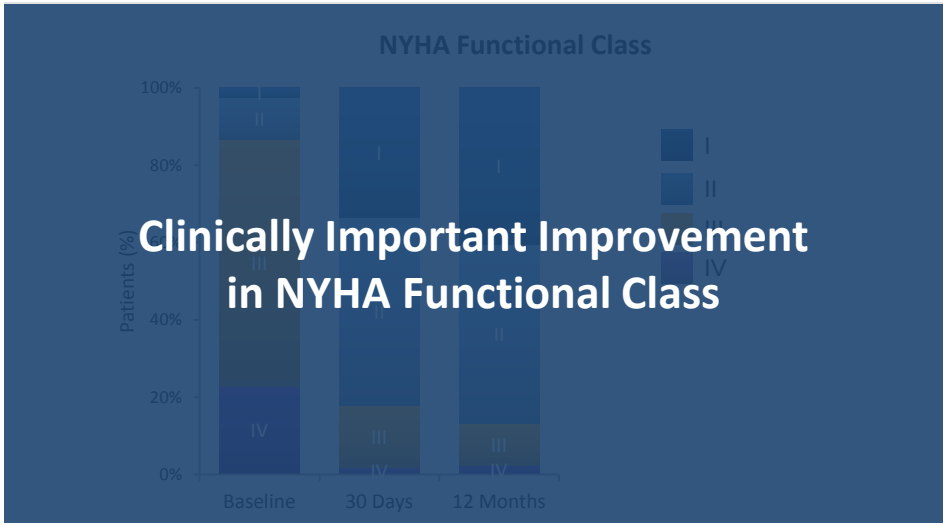
Echo features of Severe MR

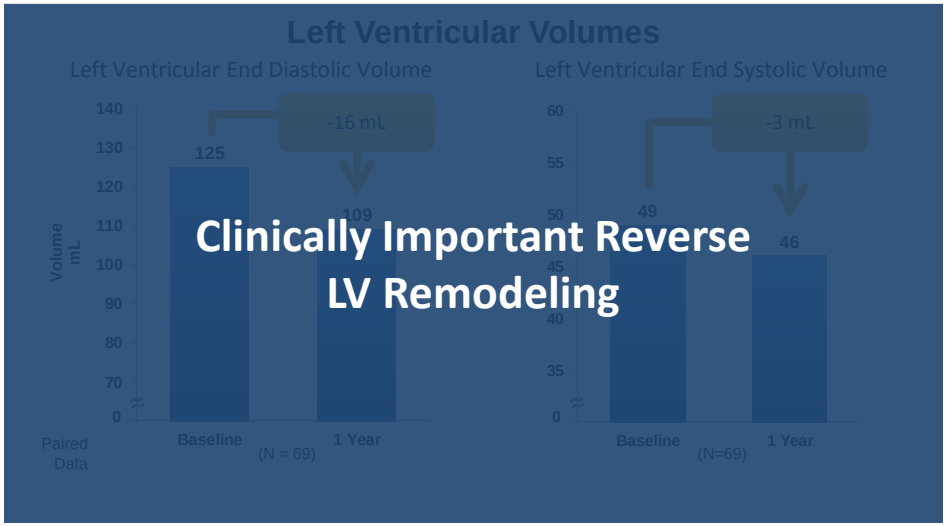
- Jet area (% of LA area) > 40%
- Vena contracta > 0.7cm
- EROA > 0.4cm2
- Reg Fraction > 50%
- Reg Volume > 60 ml/beat

EVEREST DATA – Structural MR

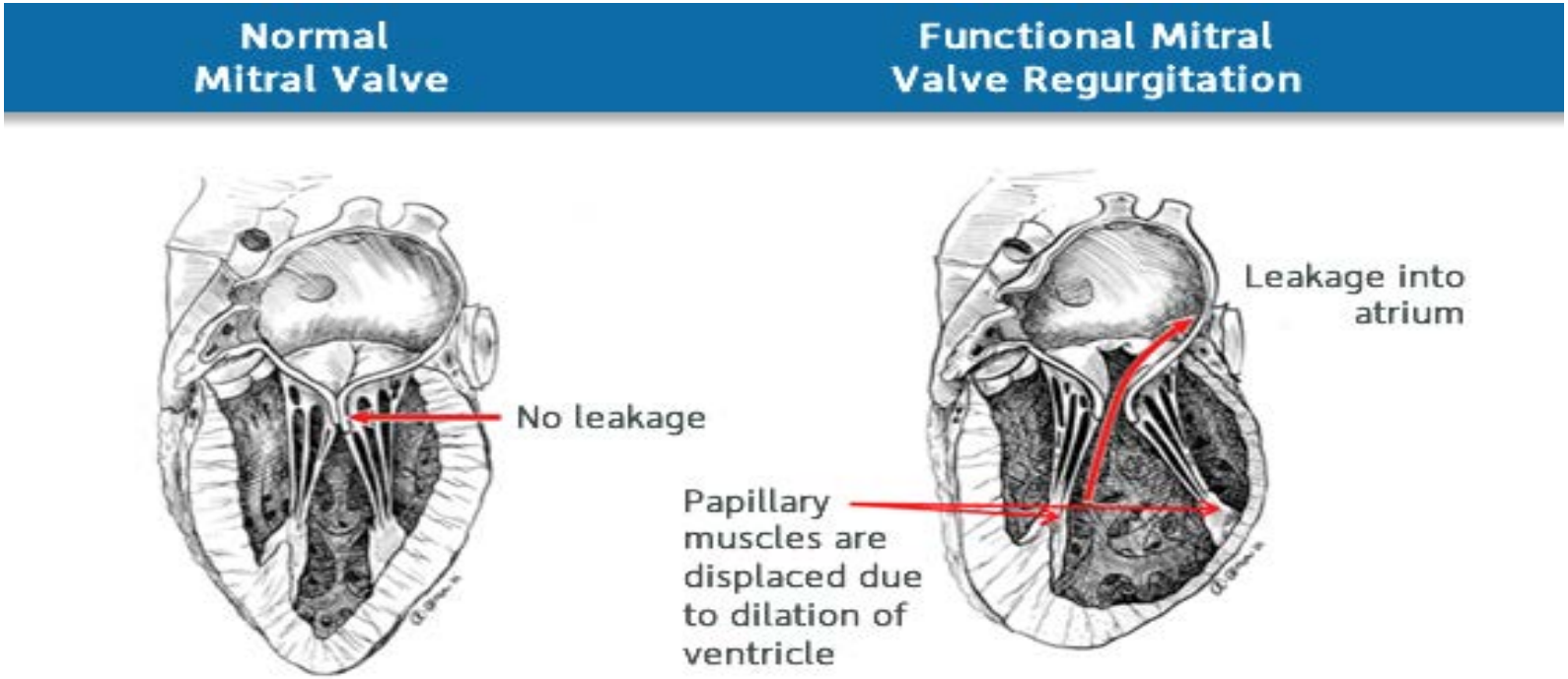








Functional MR Clinical trials MITRA FR and COAPT

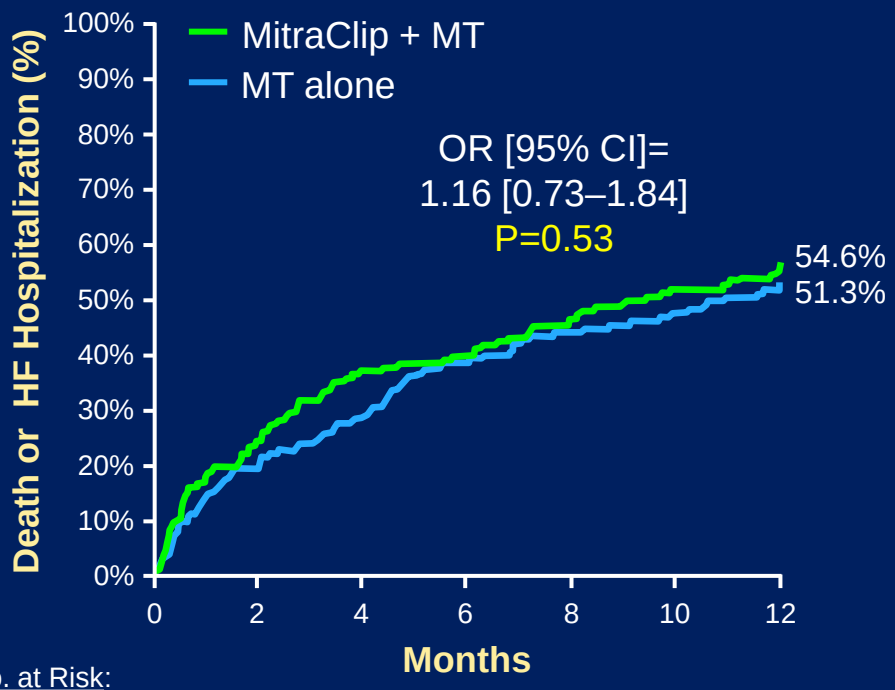


MITRA FR EUROPEAN TRIAL – NO DIFFERENCE IN CUMULATIVE END POINT OF HF READMISSION AND DEATH - AUG 2018

ALONG EXPECTED LINES AND COAPT WAS EXPECTED TO BE SIMILAR – SEPT 2018

COAPT vs. MITRA-FR: 12-Month Death or HF Hosp

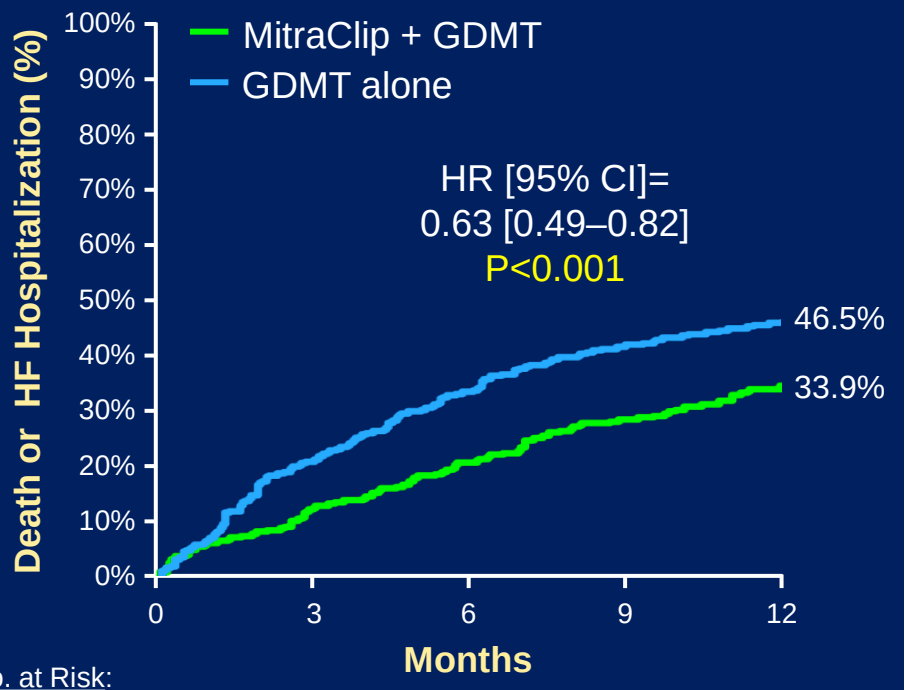
MITRA-FR



No. at Risk:

Control Group	152	123	109	94	86	80	73
Device Group	151	114	95	91	81	73	67

COAPT



No. at Risk:

Control Group	312	244	205	174	153
Device Group	302	264	238	215	194

Obadia JF et al. NEJM. 2018 Aug 27. doi: 10.1056/NEJMoa1805374

Stone GW et al. NEJM. 2018 Sept 23.

Why are the COAPT Results so Different from MITRA-FR?

Possible Reasons

	MITRA-FR (n=304)	COAPT (n=614)
Severe MR entry criteria	Severe FMR by EU guidelines: EROA >20 mm^2 or RV >30 mL/beat	Severe FMR by US guidelines: EROA >30 mm^2 or RV >45 mL/beat
EROA (mean ± SD)	31 ± 10 mm^2	41 ± 15 mm^2
LVEDV (mean ± SD)	135 ± 35 mL/m^2	101 ± 34 mL/m^2
GDMT at baseline and FU	Receiving HF meds at baseline – allowed variable adjustment in each group during follow-up per "real-world" practice	CEC confirmed pts were failing maximally-tolerated GDMT at baseline – few major changes during follow-up
Acute results: No clip / ≥3+ MR	9% / 9%	5% / 5%
Procedural complications*	14.6%	8.5%
12-mo MitraClip ≥3+ MR	17%	5%

*MITRA-FR defn: device implant failure, transf or vasc compl req surg, ASD, card shock, cardiac embolism/stroke, tamponade, urg card surg

Transcatheter Mitral Technologies

Edge-to-edge
- MitraClip*
- MitraFlex

Coronary sinus annuloplasty
- Cardiac Dimensions Carillon*
- Cerclage annuloplasty

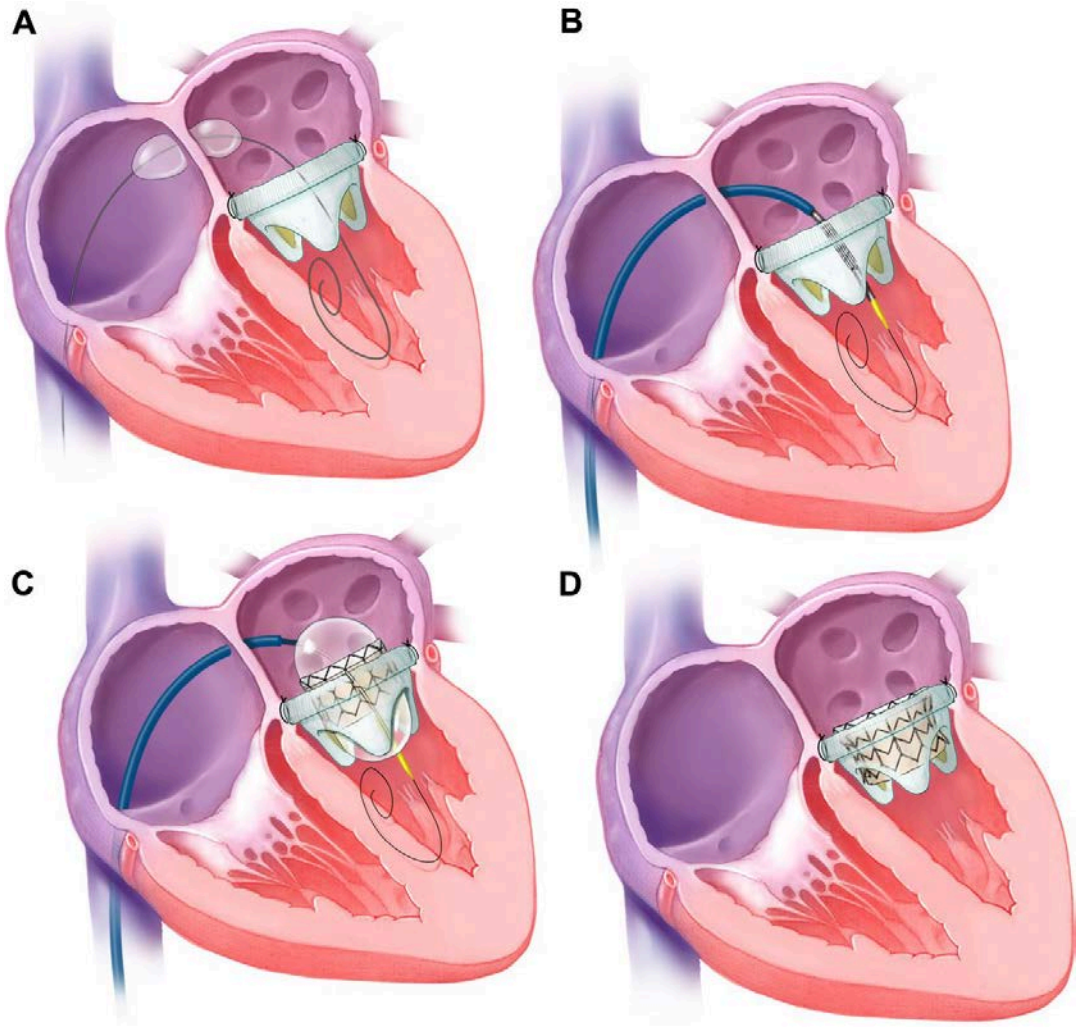
Other approaches
- MitraSpacer*
- St. Jude leaflet plication*
- Cardiac Implant perc ring
- NeoChord*
- Babic chords*
- Valtech Vchordal
- Middle Peak Medical
- Mardil BACE*
- Mitralis
- Millipede

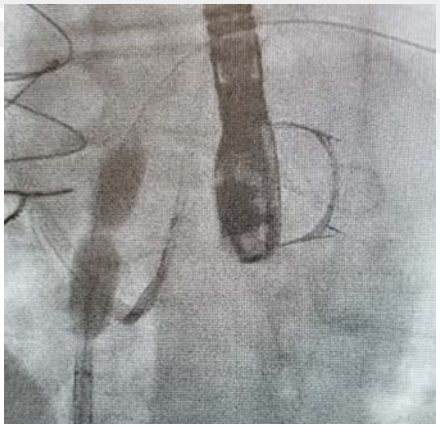
*In patients

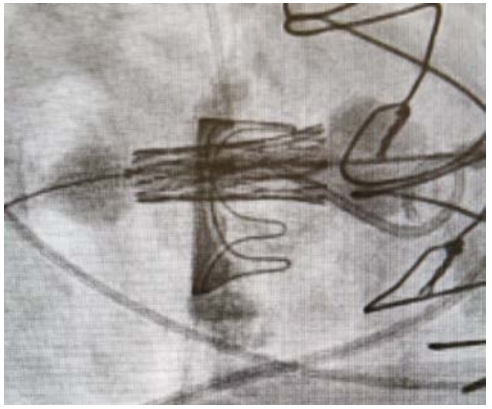
Direct annuloplasty and basal ventriculoplasty
- Mitralign Bident*
- GDS Accucinch*
- Valtech Cardioband*
- MVRx*
- Valcare*
- Mitraspan*
- Quantum Cor (RF)
- Micardia enCor

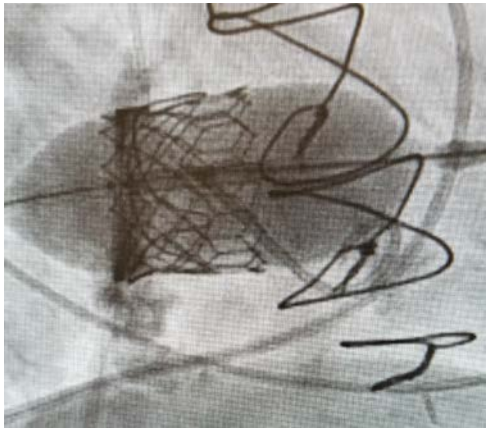
MV replacement
- Edwards CardiAQ*
- Edwards Fortis*
- Neovasc Tiara*
- Abbott Tendyne*
- Medtronic Twelve*
- NCSI Navigate
- Mvalve* • Direct Flow
- Micro Interventional
- Valtech Cardiovalve
- ValveXchange
- HighLife
- MitrAssist
- Cephea • Sinomed

Mitral Valve in Valve

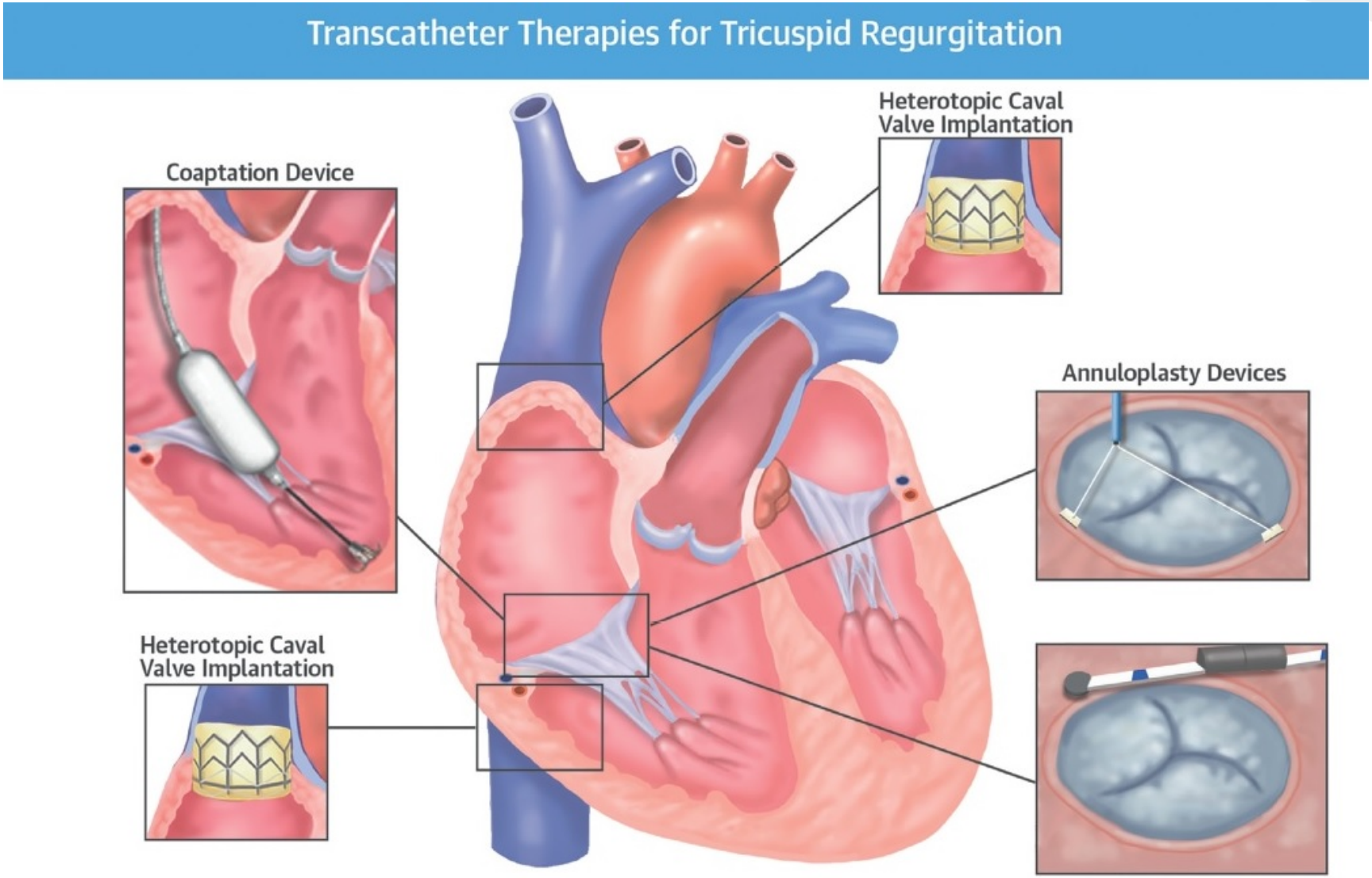




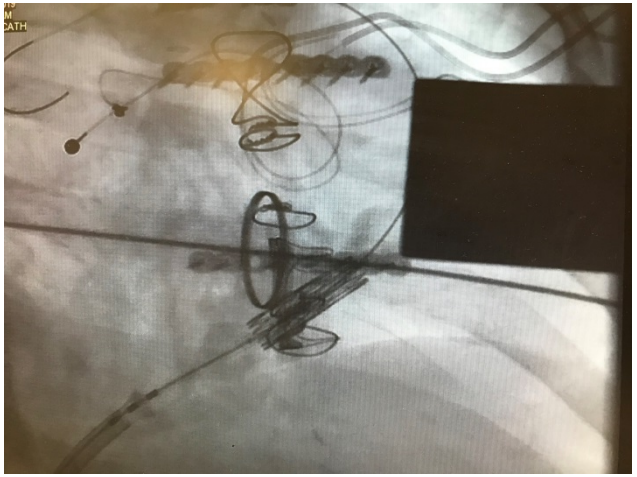


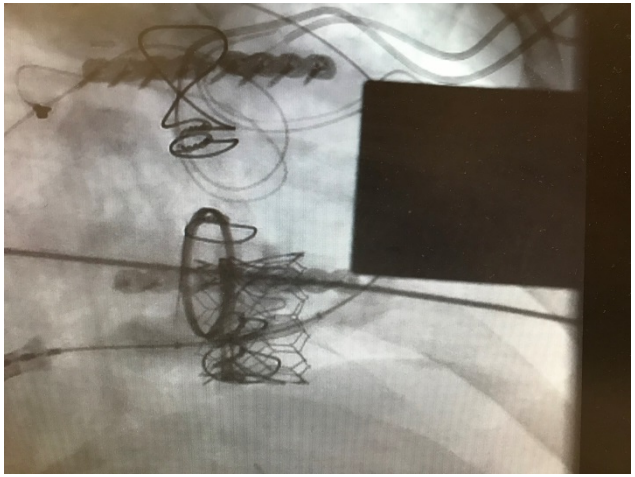


Transcatheter Tricuspid Technologies



Tricuspid Valve in Valve





52 year old female with history of tricuspid valve replacement with a 27 mm Edwards Mitral Magna pericardial tissue valve and a mechanical mitral valve replacement in August, 2013. Rheumatic etiology. Multiple admissions 2018 for acute CHF with reduced EF, paracentesis for ascites, bacteremia, and large hemorrhagic CVA while on IV Heparin. Once all above resolved, patient had a successful Tricuspid valve in valve procedure with an Edwards 29 mm SAPIEN 3 valve from a Right Femoral vein approach. Pt did very well postoperatively without complications and no readmissions during the 30 day postoperative period.

Class IIB Indication
2014 and 2017 (2019) Updated Valvular Heart Guidelines:

***Transcatheter mitral valve repair* may be considered for:**

- ***Severely symptomatic* patients (NYHA class III to IV) with**
- **Chronic severe primary (and secondary) MR (stage D) who have favorable anatomy for the repair procedure and**
- **Reasonable life expectancy**
- ***Prohibitive surgical risk* because of severe comorbidities**
- ***Remain severely symptomatic despite optimal GDMT for HF***

- The clip was found to be SAFE, (BUT LESS EFFECTIVE than surgical repair) because residual MR was more prevalent.

- **Clip did reduce Mortality, heart failure readmissions, severity of MR, improved symptoms, and led to reverse LV remodeling.**

Percutaneous mitral valve repair should only be considered for patients with chronic primary (and secondary) MR who remain severely symptomatic with NYHA class III to IV HF symptoms despite optimal GDMT for HF and who are considered inoperable (high risk).

Who should be referred to the Valve Clinic?

1. **Severe MR – Both Structural and Functional**
2. **Moderate MR with Heart Failure or LVEF <60**
3. **Moderate MR with Afib**

Scheduler

Nancy Mayhew 321 841 4324

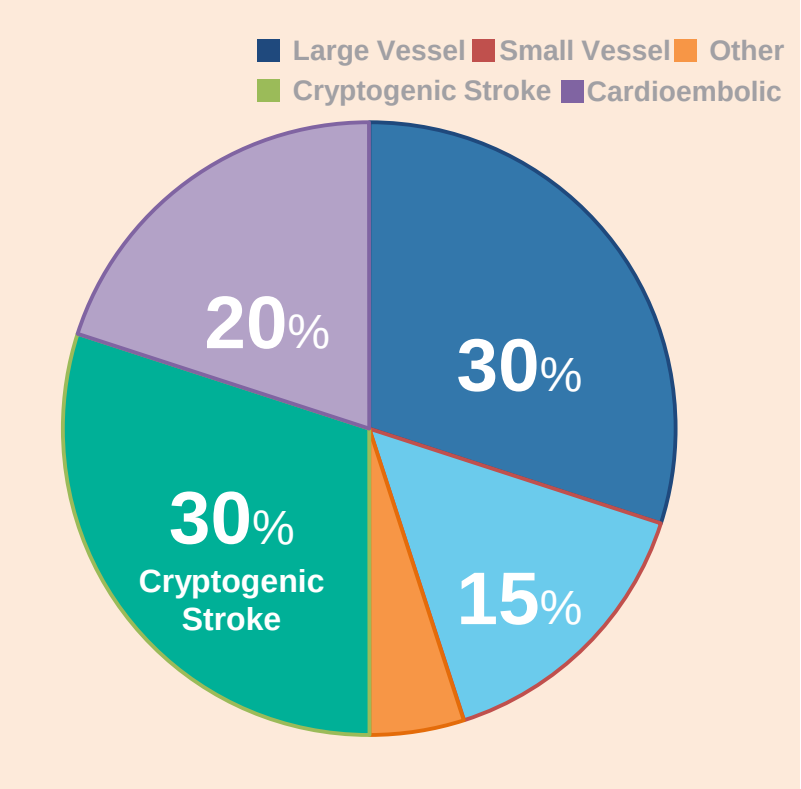
PFO CLOSURE TO PREVENT CRYPTOGENIC STROKE:

The evidence is indisputable !

Why Talk About Cryptogenic Stroke?

- 678,000 ischemic strokes every year in the US[1]
  - Leading cause of disability in the US and worldwide
- ~200,000 cryptogenic strokes yearly[1]
- Most cryptogenic stroke patients receive anti-platelet for secondary prevention[2]
- Long-term monitoring reveals AF in ~30% of cryptogenic stroke patients[3-8]
  - These patients benefit from anticoagulant therapy

Ischemic Stroke



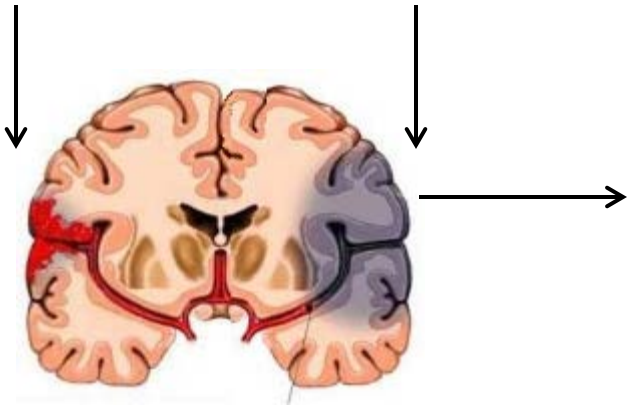
1. Mozzafarian D et al. 2015;131:e29-e322; **2.** Kernan WN et al. *Stroke.* 2014;45:2160-2236; **3.** Sacco RL et al. *Ann Neurol.* 1989;25:382-390; **4.** Petty GW et al. Stroke. 1999;30:2513-2516; **5.** Kolominsky-Rabas PL et al. *Stroke.* 2001;32:2735-2740; **6.** Schulz UG et al. *Stroke.* 2003;34:2050-2059; **7.** Schneider AT et al. *Stroke.* 2004;35:1552-1556; **8.** Lee BI et al. *Cerebrovasc Dis.* 2001;12:145-151; **9.** Sanna T et al. *N Engl J Med.* 2014;370:2478-2486.

The Challenge of Cryptogenic Stroke

Stroke etiologies

Vessel Rupture (15%)

Artery Occlusion (85%)



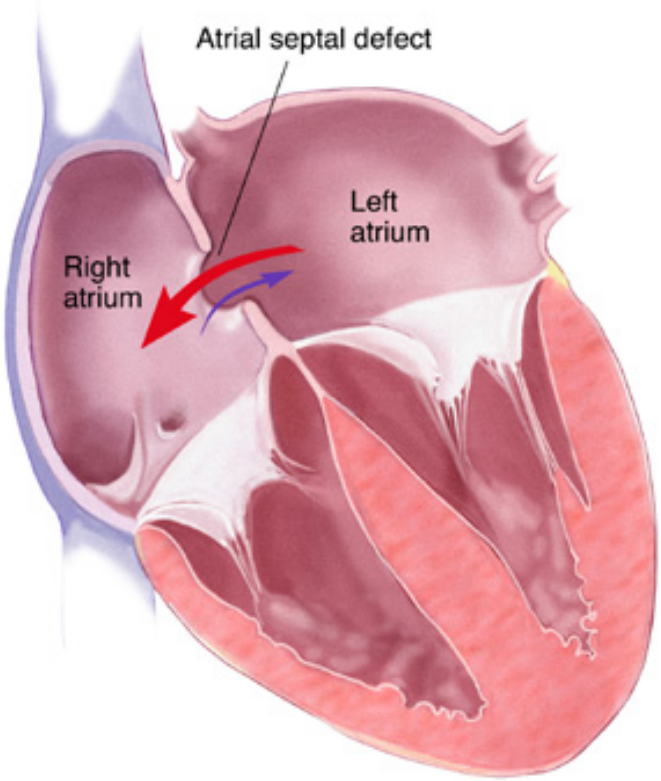
Types of Ischemic Stroke

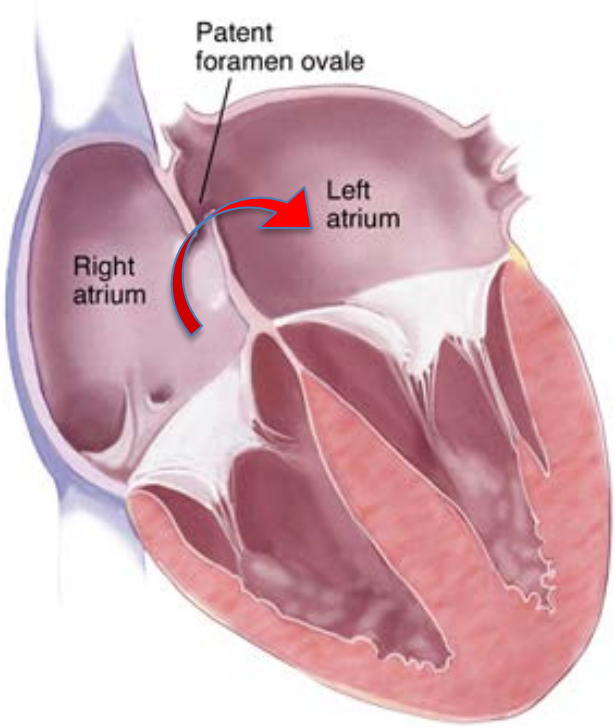
- **Atherothrombotic (25-30%)**
  Stenotic artery feeding area of infarction - CAROTID
- **Cardioembolic (20%)**
  A thrombus or other material dislodges from the heart or aortic arch - A FIB
- **Lacunar/Small Vessel (15-20%)**
  Small, deep infarct - HTN
- **Other/Uncommon (5-10%)**
  Small, deep infarct – Hypercogulable state
- **Cryptogenic (25-40%)**
  Unknown cause

Adams HP Jr, Stroke. Jan 1993; 24; 35-41

ASD

PFO



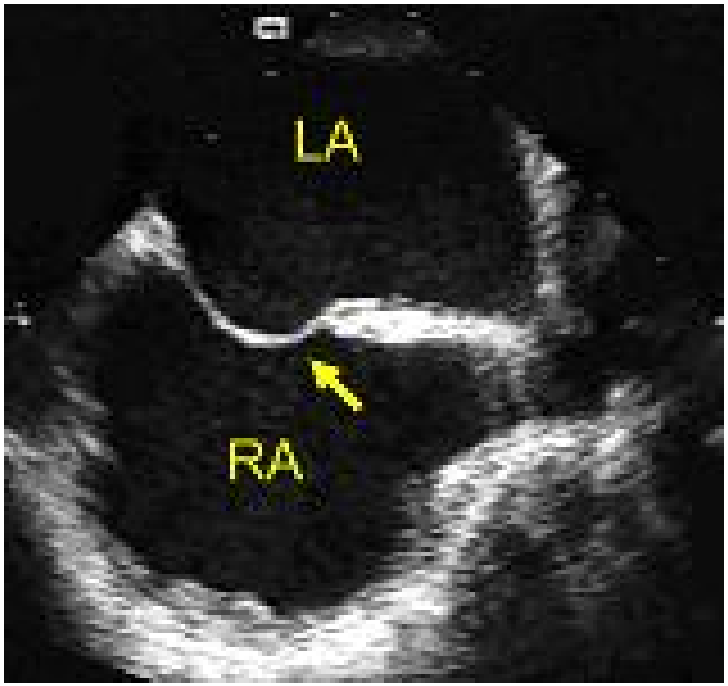


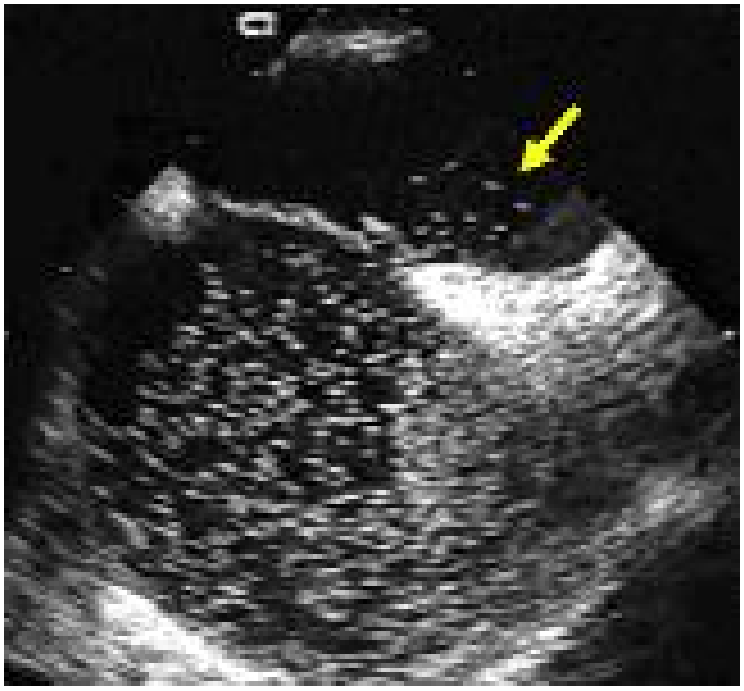
ASD is a congenital anomaly in the formation of the components of the interatrial septum WHEREAS PFO is a remnant of the fetal circulation with incomplete closure of the foramen ovale.

PFO: Clinical Consequences

- Approximately one out of every four adults has a PFO
- Asymptomatic and the heart size is normal.
- Hypoxemia upon standing but not on lying (platypnea orthodeoxia). This is alleviated by closing the PFO
- Decompression sickness – scuba divers
- Migraine headaches ?
- Cryptogenic strokes: 25-40% of ischemic strokes
- 70% of ischemic strokes are due to atherosclerosis (carotid, ascending aorta), thromboembolism (LA, LV, A Fib), Hypercoagulable state and small vessel pathology.

Patent Foreman Ovale – Bubble Study





Agitated saline bubble contrast is commonly injected intravenously during echo visualization

Barry A Love, MD, Assistant Professor, Department of Medicine, Division of Cardiology, Assistant Professor, Division Pediatric Cardiology, Pediatrics and Medicine, Division of Pediatric Cardiology, Mount Sinai School of Medicine

Percutaneous Closure of PFO

Amplatzer PFO Occluder

Illustration courtesy of
AGA Medical Corp.

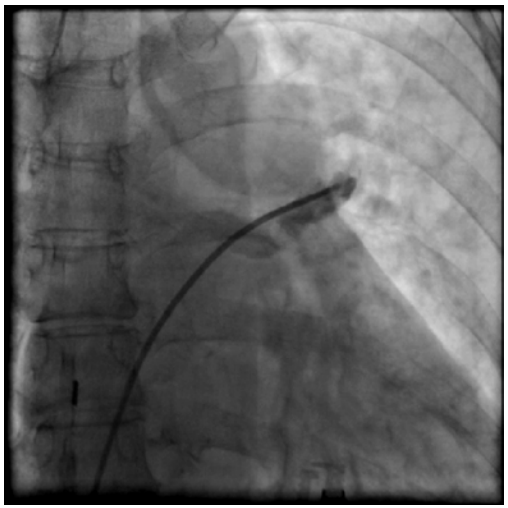
CardioSEAL Septal Occluder

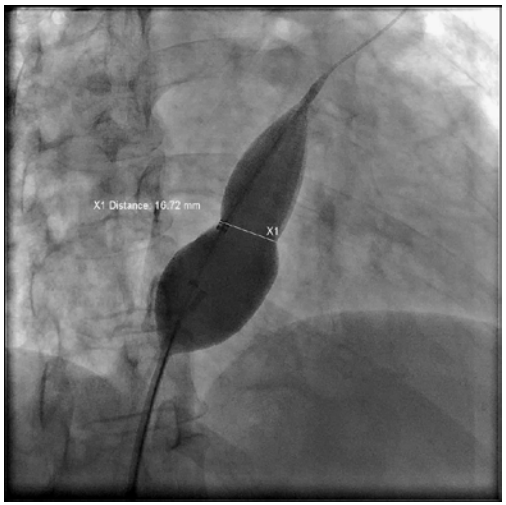
Illustration courtesy of
NMT Medical

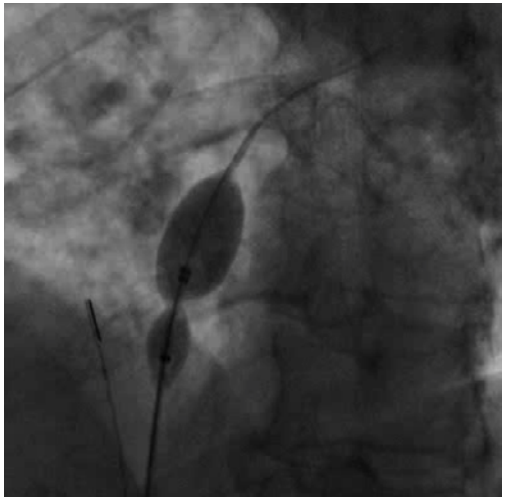
Gore Helix Septal Occluder

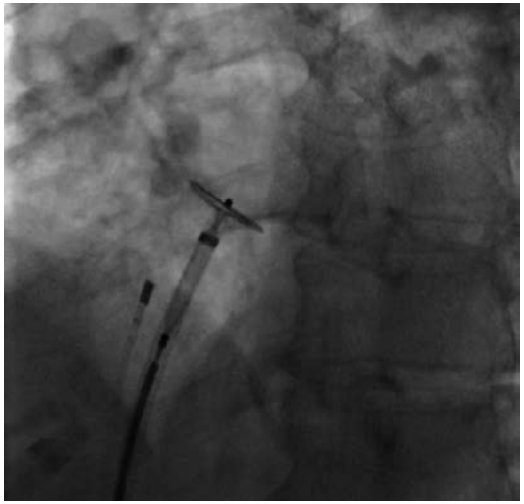
Illustration courtesy of
W. L. Gore & Associates, Inc.

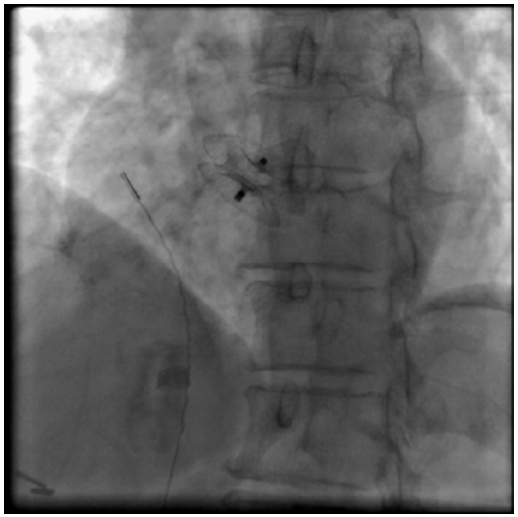
Transcatheter Closure of ASD / PFO

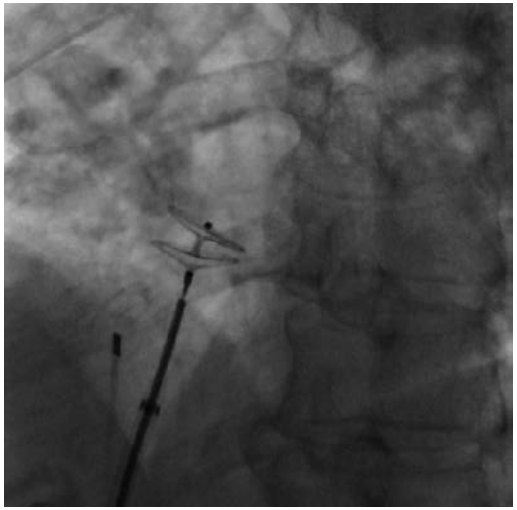




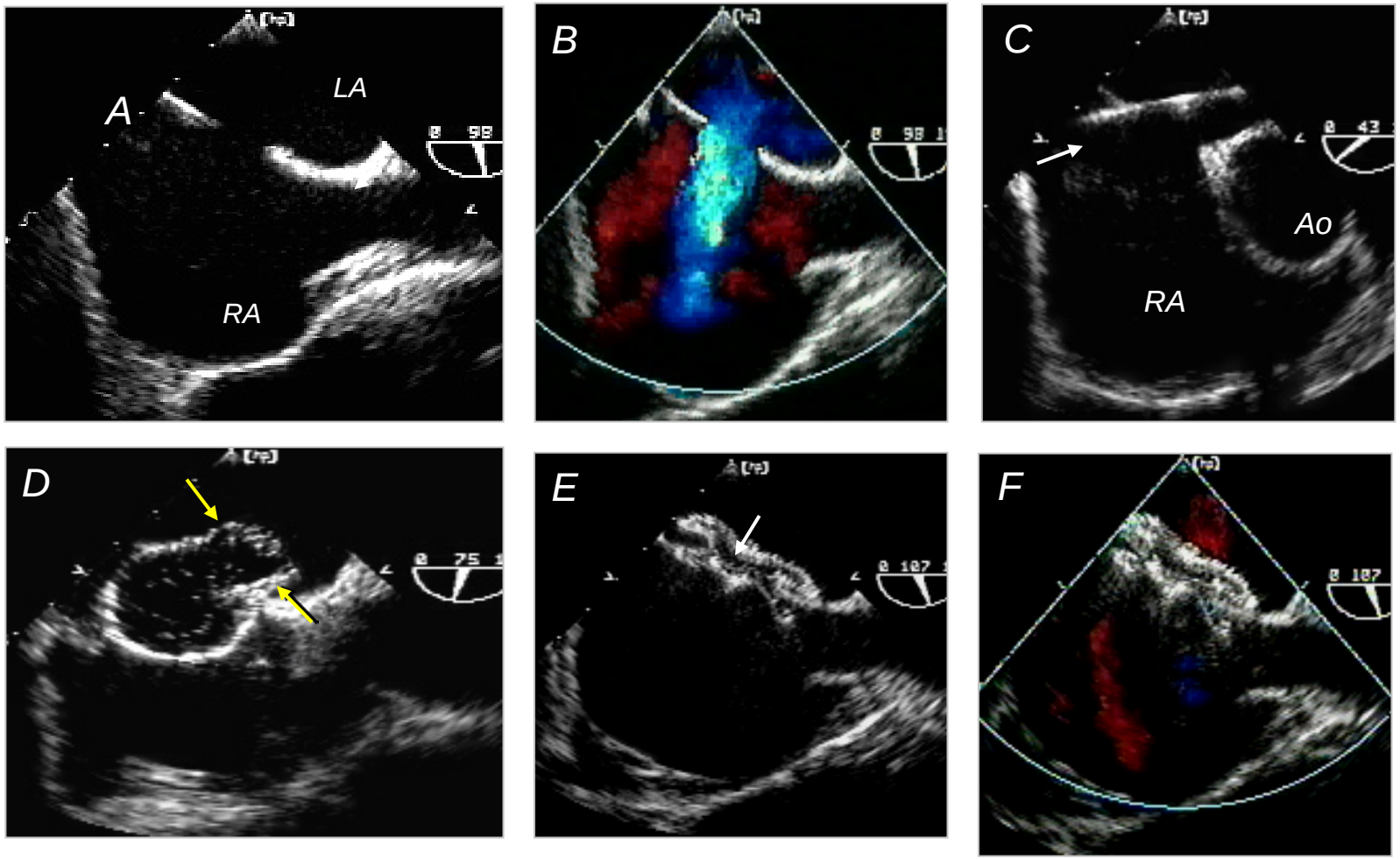








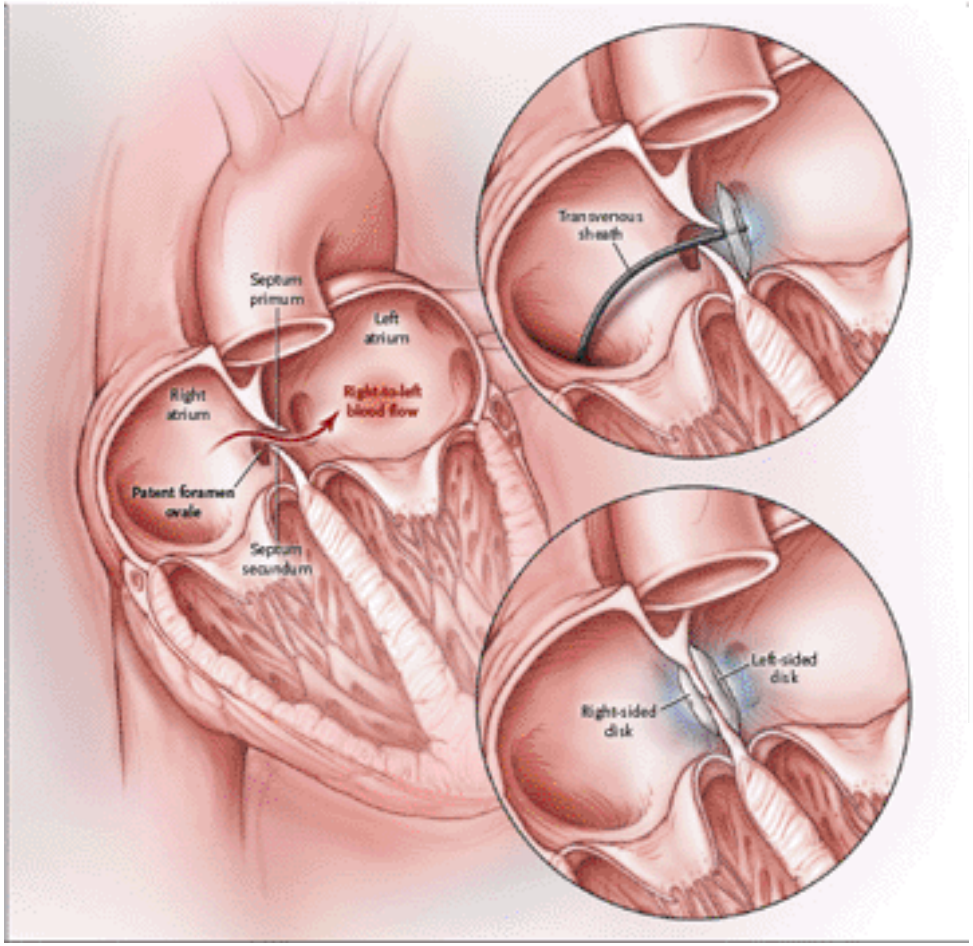
Transcatheter Closure of Secundum ASD

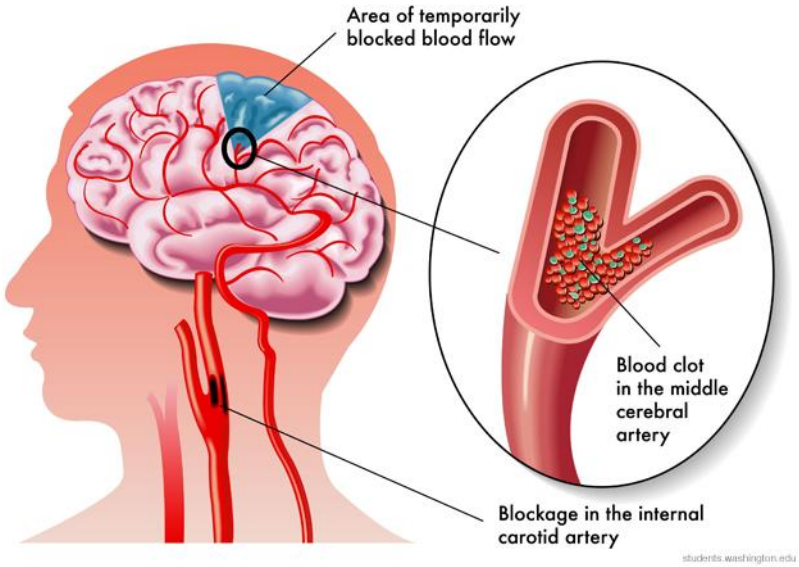


Potential Complications

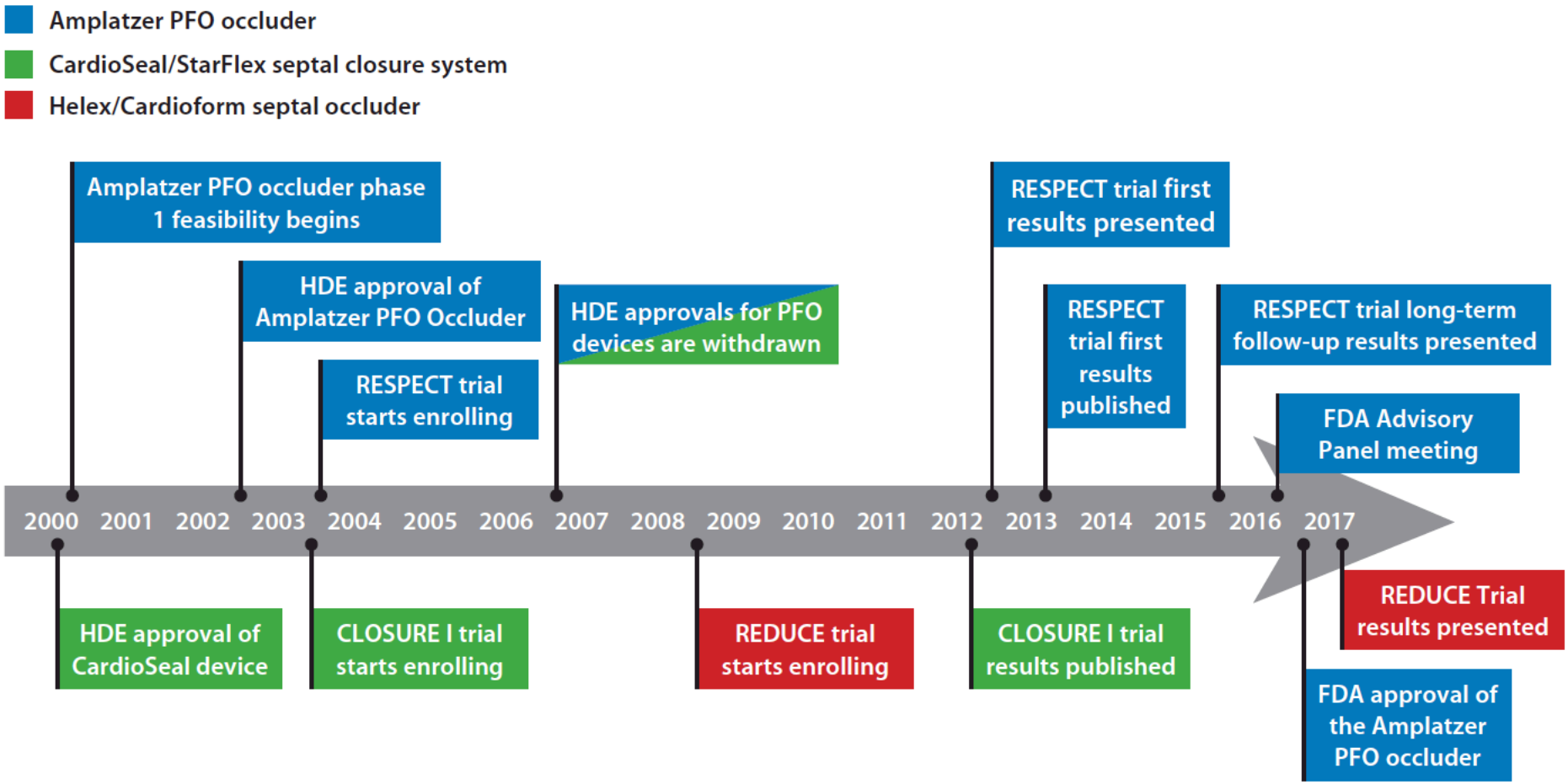
- **Device dislodgement** –(0.5 – 1%) usually immediately but rarely upto 1 week out. Seen with larger devices. Often into RV and pulm artery, rarely into left atrium
- **Device erosion** – in 24 - 48 hours often fatal.
- Incomplete sealing
- **Arrhythmias: A. Fib** (5%)
- Air embolism and thromboembolism
- Perforation of vessel or myocardium
- Headache, migraine, stroke or TIA
- Infection and endocarditis

Does closure of PFO reduce stroke?





PFO CLOSURE – TIMELINE



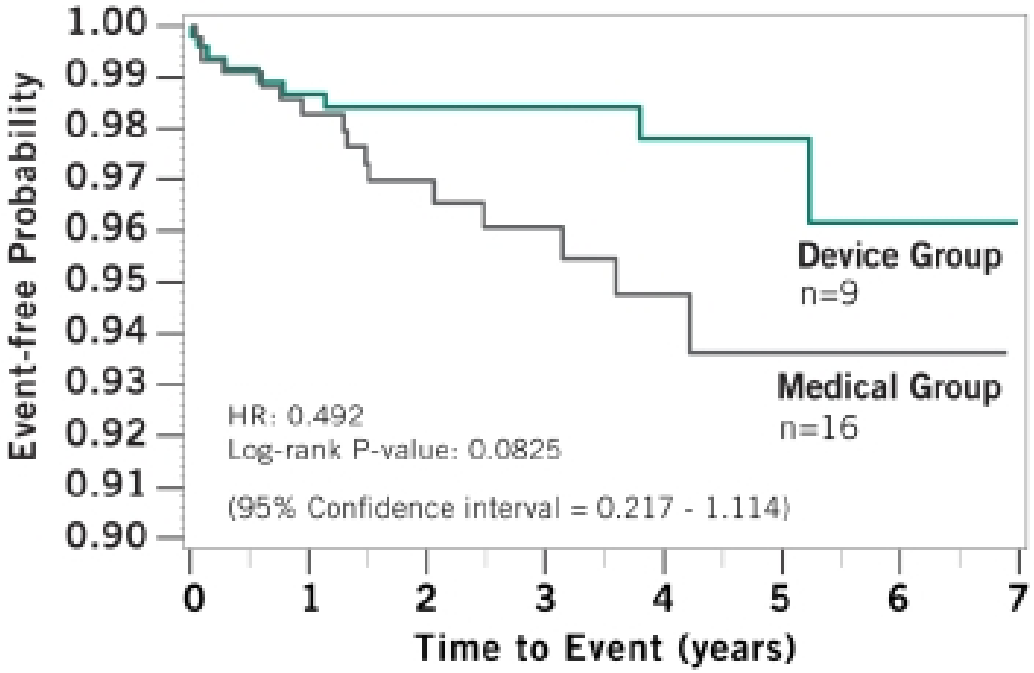
Clinical Trials in PFO Closure

Trials	Pts	Inclusion	Endpoints	Results	Company Device
Closure I	909	CS or TIA	Stroke, TIA, death	5.5% vs 6.8% More complications and A Fib	Starflex NMT
Mist	147	Migraine	Resolution Reduction	Aborted	Starflex NMT
Premium **Prima**	230	Migraine	Reduction	Ongoing Not Enroling	Amplatzer St Jude
PC	414	Stroke, TIA, Periph Embolism	Death, Stroke, TIA, Periph Embolism	37% RR – Not significant	Amplatzer St Jude
Respect	980	CS by MRI	Stroke, Death	51% RR 80% Stroke RR – Not signifcant	Amplatzer St Jude
Reduce	664	CS or TIA by MRI	2nd Stroke or TIA by MRI	Enroling 2018	Helex Gore

RESPECT Efficacy Analyses
980 patients – 3 years

RESPECT CLINICAL TRIAL

Primary Endpoint Analyses – ITT Cohort
***50.8%** risk reduction of stroke in favor of device*



3 of the 9 strokes occurred in patients without a device

There was cross over

ORLANDO HEALTH®

1. P-values ITT Raw Count are calculated using Fisher's Exact Test; all other P-values are calculated Log-Rank Test

PFO CLOSURE – THE SAGA

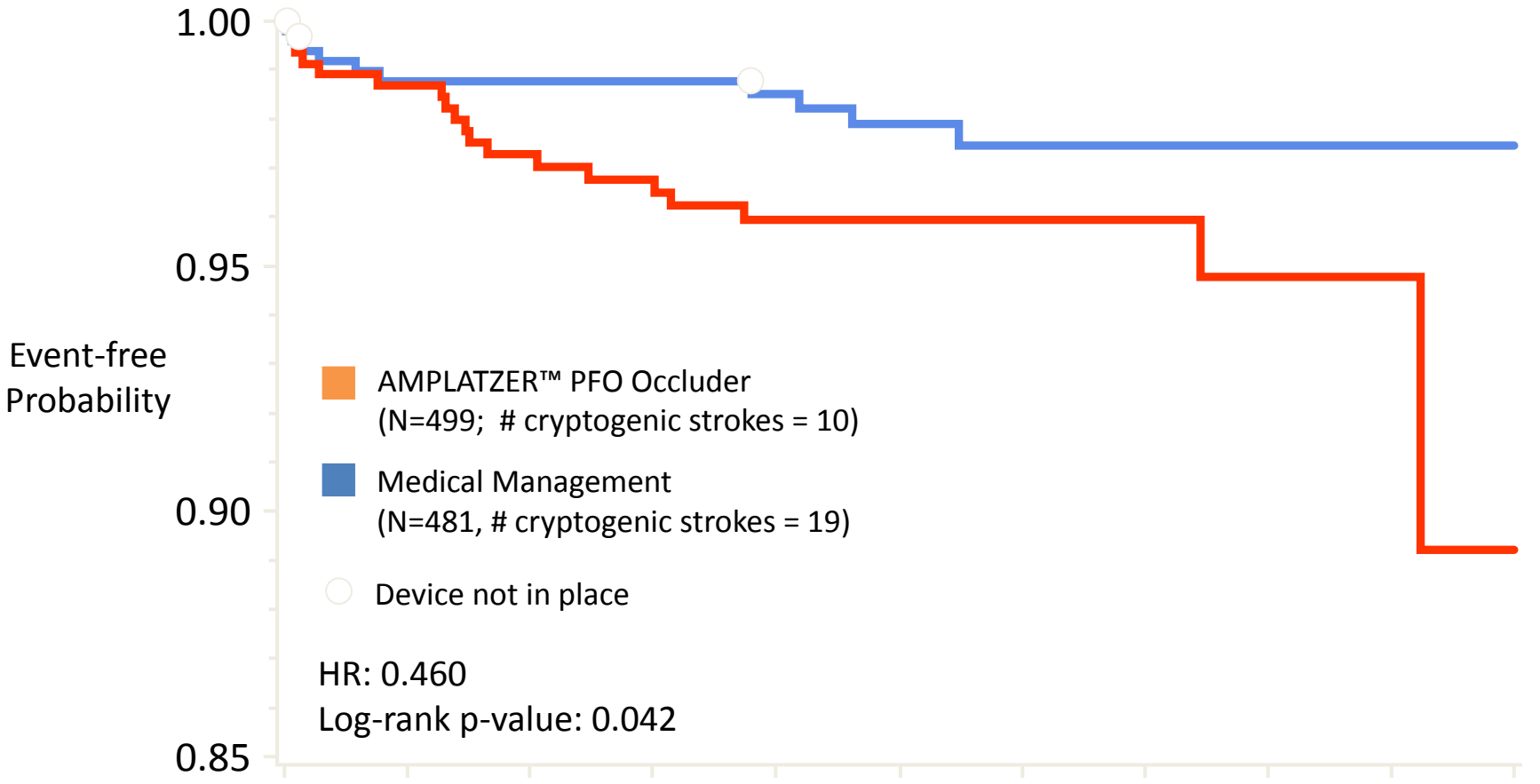
Nov 2015

RESPECT Extended follow up

5.5 years

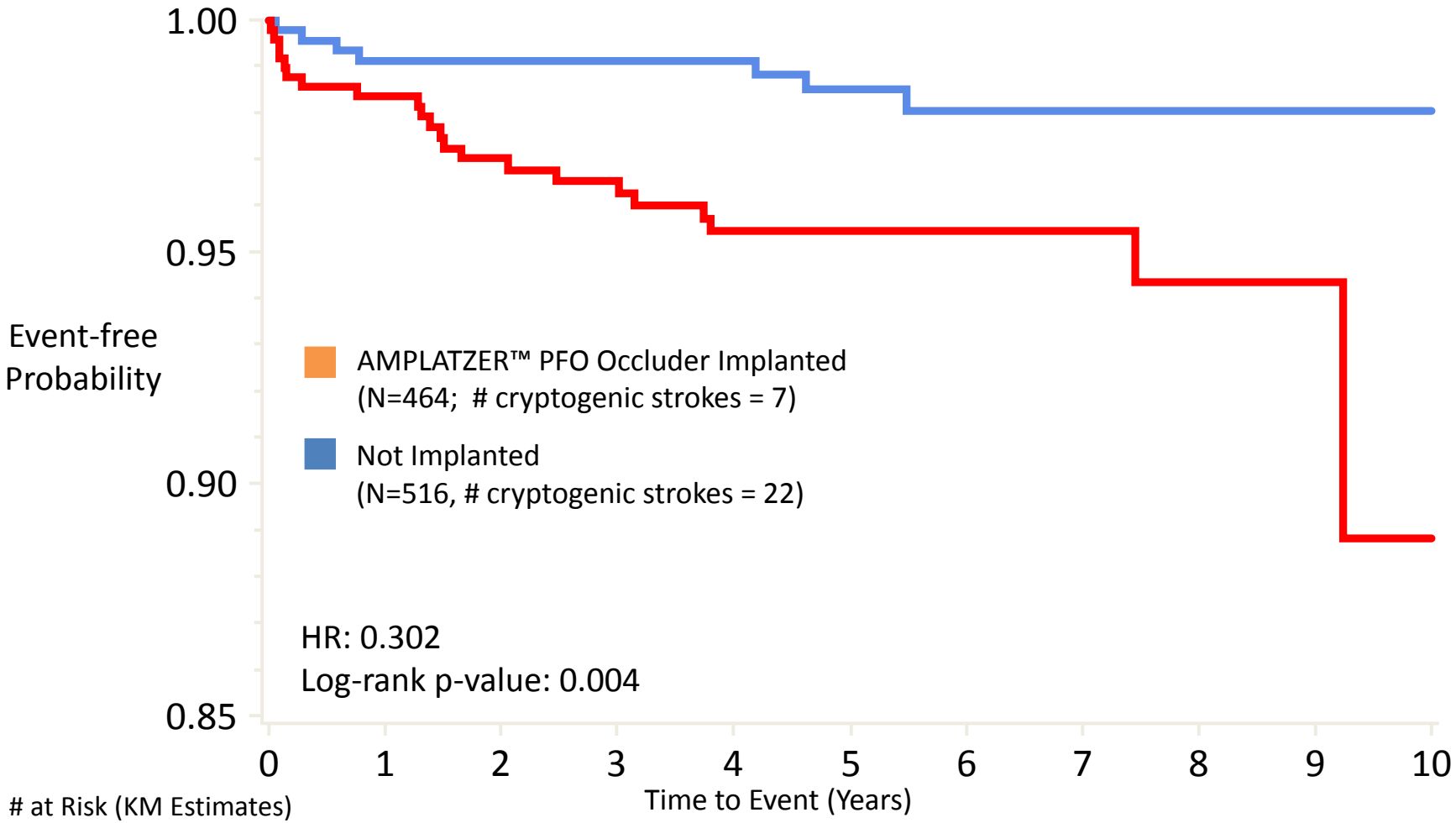
Significant Reduction in Recurrent Cryptogenic Stroke

54% Relative Risk Reduction in ITT Population



# at Risk (KM Estimates)						
AMPLATZER	499 (0%)	463 (1.2%)	369 (1.5%)	212 (2.5%)	86 (2.5%)	20 (2.5%)
MM	481 (0%)	394 (2.7%)	307 (4.1%)	168 (4.1%)	71 (5.2%)	10 (10.8%)

70% Relative Risk Reduction in Recurrent Cryptogenic Stroke With Device In Place



at Risk (KM Estimates)

AMPLATZER	464 (0%)	445 (0.9%)	357 (0.9%)	206 (1.9%)	82 (1.9%)	20 (1.9%)
Not Implanted	516 (0%)	412 (3.0%)	319 (4.6%)	174 (4.6%)	75 (5.7%)	10 (11.2%)

PFO CLOSURE – THE SAGA

October 2016 – FDA Approval

PFO CLOSURE – THE VERDICT

REDUCE Results: 2017

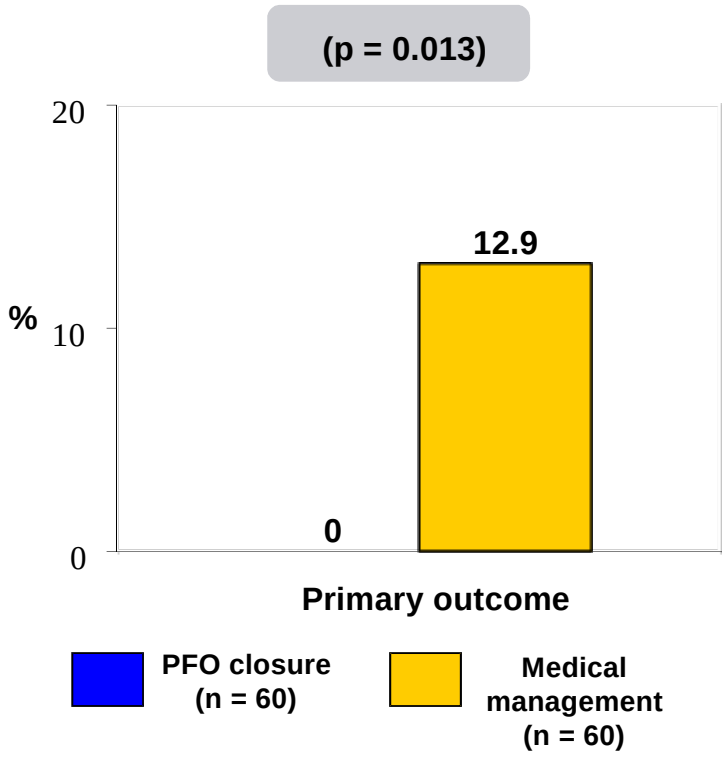
- Helex septal occluder or Cardioform- GORE
- 63 sites 7 countries in North America and Europe
- 664 patients Age 18-59
- PFO by TEE and stroke within 6 months
- PFO vs Antiplatelets
- 3.4 year follow up.
- **Clinical Strokes : Helex 6 vs Controls 12**
- Silent Stroke by MRI – similar outcomes
- RRR 77%, NNT 28
- Increase in Atrial Fibrillation

CLOSE Results: 2017

- Amplatzer PFO occluder - St Jude
- France 32 sites Germany 2 sites
- 663 patients Age 16-60
- PFO with ASA or large shunt
- PFO vs Anticoagulants vs Antiplatelets
- 5.3 year follow up.
- **Strokes : Amplatzer 0 vs Controls 14**
- 4.9 % ARR, 97% RRR
- Increase in Atrial Fibrillation (11 vs 2)

DEFENSE-PFO 2018

Trial design: Patients with high-risk PFO were randomized in a 1:1 fashion to either PFO closure with the Amplatzer PFO Occluder or medical management. Patients Were followed for 2 years. The trial was terminated early.



Results

- Primary outcome, stroke/vascular death/TIMI major bleeding over 2 years: Closure vs. medical management: 0 vs. 12.9%, p = 0.013
- Ischemic stroke: 0 vs. 10.5%, p = 0.023
- Hemorrhagic stroke: 0 vs. 2.5%, p = 0.3
- TIA: 0 vs. 2.0%, p = 0.32
- New ischemic lesion on MRI: 8.8% vs. 18.4%, p = 0.24

Conclusions

- PFO closure among patients with cryptogenic stroke and high-risk PFO (atrial septal aneurysm, hypermobility, or large size) was superior to medical management alone.

Presented by Dr. Jae-Kwan Song at ACC 2018

Summary of PFO Closure Trial Outcomes

Trial	ARR / 100	NNT	F/U (Mean Yrs)
Closure 1	1.3	77	2
PC	1.8	55	4.1
Respect - EF	2.2	45	5.9
Reduce	4	25	3.2
Close	6	17	5.3

Defense PFO results suggest that the NNT is 10 to prevent one stroke at 2 years for high –risk PFO Closure

Conclusions

- AMPLATZER™ PFO Occluder is clearly superior to medical management in reducing recurrent cryptogenic ischemic stroke
  - Superiority is strongly significant if
    - Age <60 yrs
    - Large shunt
    - Shunting even without Valsalva
    - Atrial septal aneurysm
- Procedure and device are safe
- FDA emphasizes a team approach with Neurologists

PFO Occluder - Post Approval Study

- Orlando Health is the only site in Central Florida
- Eligible patients – patients who have had a cryptogenic stroke within 9 months

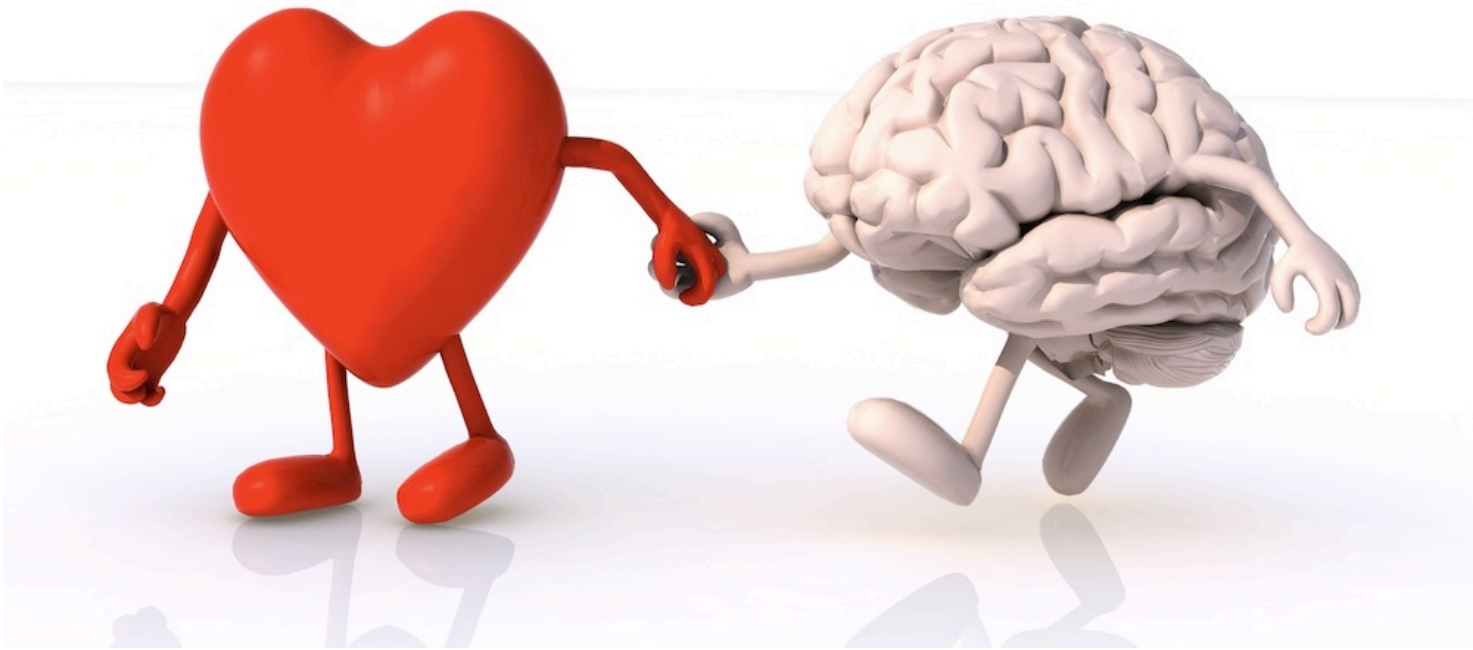
Primary Investigator – Dr. Vijay Kasi MD

Co Investigator – Dr. Christian Rosado MD

- Contact

Susan Anthony	Meghan Tinetti
321 841 1505	321 841 3682
Susan.Anthony@orlandohealth.com	Meghan.Tinetti@orlandohealth.com

THE HEART BRAIN TEAM



THANK YOU!

THANK YOU

Vijay Kasi, MD, PhD, FACC

Oct 5, 2019