Repairing the Mitral Valve:Current Surgical Approach to Mitral Preservation (primary MR)

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Recommendations from ACC/AHA Guidelines- Important Surgical Aspects

Timing of surgery

Choice of surgeon and procedure

Timing of surgery-Clinically Deceptive

-Late referral - little impact on acute surgical risk, repairability or quality of repair. Patient appears to recovers well in short term.

BUT: Proper timing essential for optimal 10-20 year survival.

STS Adult Cardiac Surgery Database 2018 Data from 87,214 Mitral Surgeries:2011-2016

Isolated Mitral Valve Surgery: The Society of Thoracic Surgeons Adult Cardiac Surgery Database Analysis

James S. Gammie, MD, Joanna Chikwe, MD, Vinay Badhwar, MD, Dylan P. Thibault, MS, Sreekanth Vemulapalli, MD, Vinod H. Thourani, MD, Marc Gillinov, MD, David H. Adams, MD, J. Scott Rankin, MD, Mehrdad Ghoreishi, MD, Alice Wang, MD, Gorav Ailawadi, MD, Jeffrey P. Jacobs, MD, Rakesh M. Suri, MD, Steven F. Bolling, MD, Nathaniel W. Foster, BS, and Rachael W. Quinn, PhD

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Background. Data from The Society of Thoracic Surgeons Adult Cardiac Surgery Database were analyzed to identify trends in patient characteristics and outcomes of mitral valve operations in North America.

Methods. All patients with isolated primary mitral valve operations with or without tricuspid valve repair, surgical atrial fibrillation ablation, or atrial septal defect closure performed July 2011 to September 2016 were identified. A subgroup analysis assessed patients with degenerative leaflet prolapse (DLP).

Results. Isolated primary mitral valve operations were performed on 87,214 patients at 1,125 centers, increasing by 24% between 2011 (n = 14,442) and 2016 (n = 17,907). The most common etiology was DLP (60.7%); 4.3% had functional mitral regurgitation. Preoperatively, 47.3% of patients had an ejection fraction less than 60% and 34.2% had atrial fibrillation. Overall mitral valve repair rate was 65.6%, declining from 67.1% (2011) to 63.2% (2016; $p < 0.0001$). Repair rates were related to etiology (DLP, 82.5%; rheumatic, 17.5%). Of the 29,970 mitral valve replacements, 16.2% were preceded by an attempted repair. Repair techniques included prosthetic annuloplasty (94.3%), leaflet resection (46.5%), and artificial cord implantation (22.7%). Bioprosthetic valves were implanted with increasing frequency (2011, 65.4%; 2016, 75.8%; $p < 0.0001$). Less-invasive operations were performed in 23.0% and concomitant tricuspid valve repair in 15.7%. Unadjusted operative mortality was 3.7% (replacements) and 1.1% (repairs).

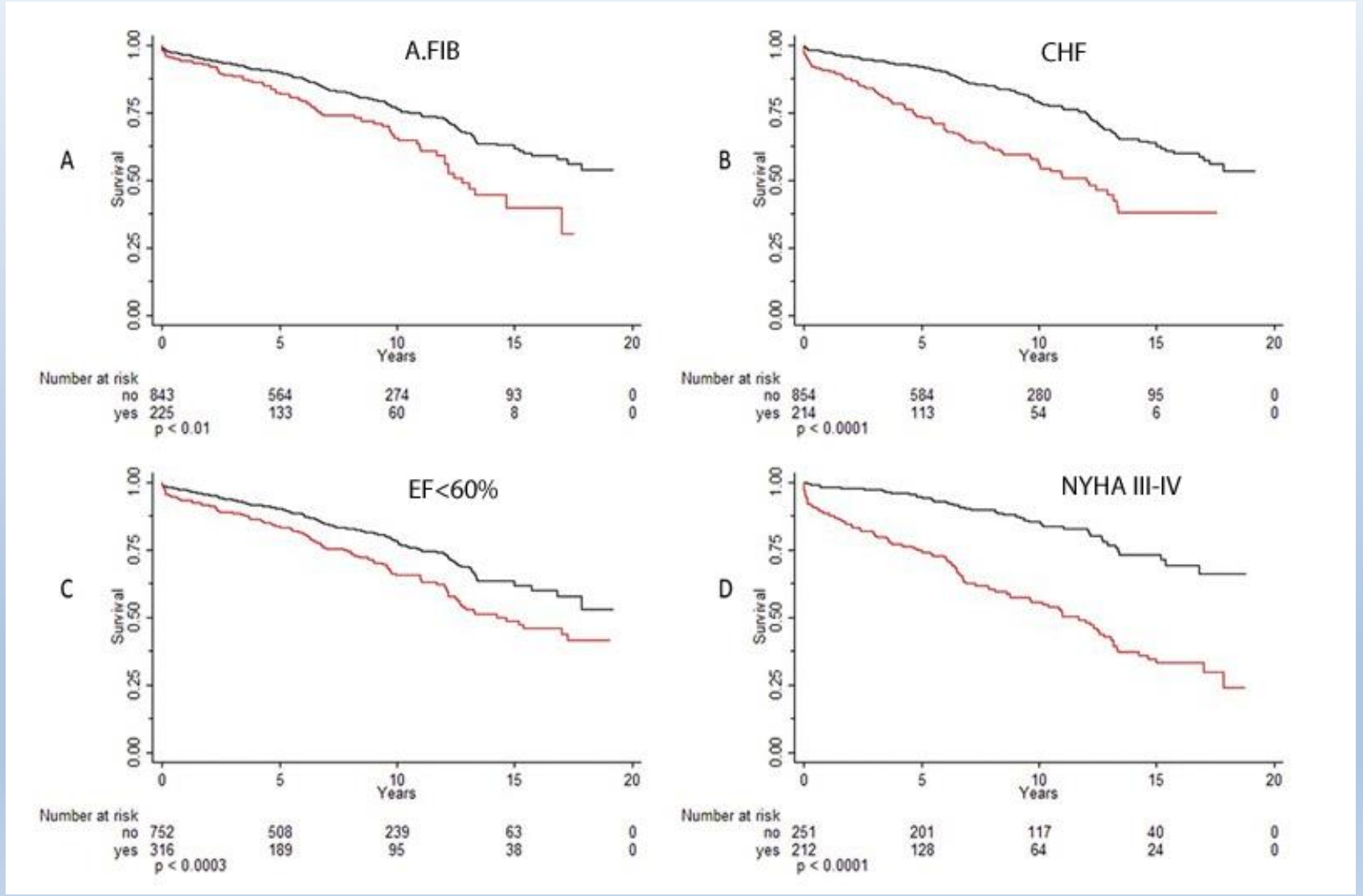
Conclusions. Patients undergoing primary isolated mitral valve operations commonly have ventricular dysfunction, atrial fibrillation, and heart failure. Although contemporary outcomes are excellent, earlier guideline-directed referral and increased frequency and quality of repair may further improve results of mitral valve operations.

(Ann Thorac Surg 2018;106:716–27)

- **81% referred late** - EF<60%, A.fib, CHF

Impact of Avoidable Risk Factors on 10-15 Year Survival: 91% referred late. 10-20% penalty

Lawrie et al, Ann Thorac Surg 2021;112:1921-1928



Medical therapy does not alter natural history and should not be used to “delay” intervention.

Chronic *Primary* Mitral Regurgitation: Medical Therapy

Otto et al 2020 ACC/AHA Guidelines

Recommendations	COR	LOE
Medical therapy for systolic dysfunction is reasonable in symptomatic patients with chronic primary MR (stage D) and LVEF less than 60% in whom surgery is not contemplated	IIa	B
Vasodilator therapy is not indicated for normotensive asymptomatic patients with chronic primary MR (stages B and C1) and normal systolic LV function	III: No Benefit	B

Helping Cardiovascular Professionals Learn. Advance. Heal.

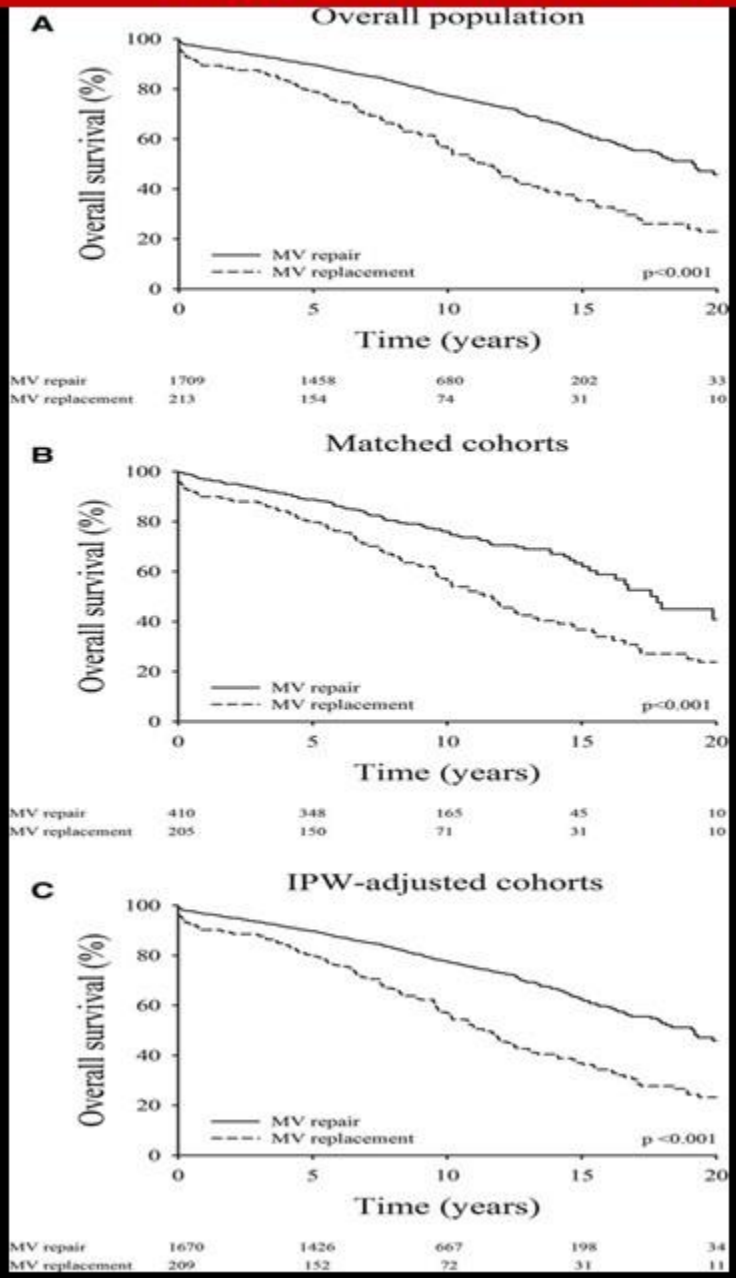
American Heart Association.

Choice of Surgeon

Significance:

MV replacement is a very poor alternative to MR repair for primary degenerative MR in all age groups and categories. Unacceptable outcome.

20 Yr Outcome Mitral Valve Repair vs Replacement for Degenerative Mitral Regurgitation, MIDA Circulation, 2017;135:410-422

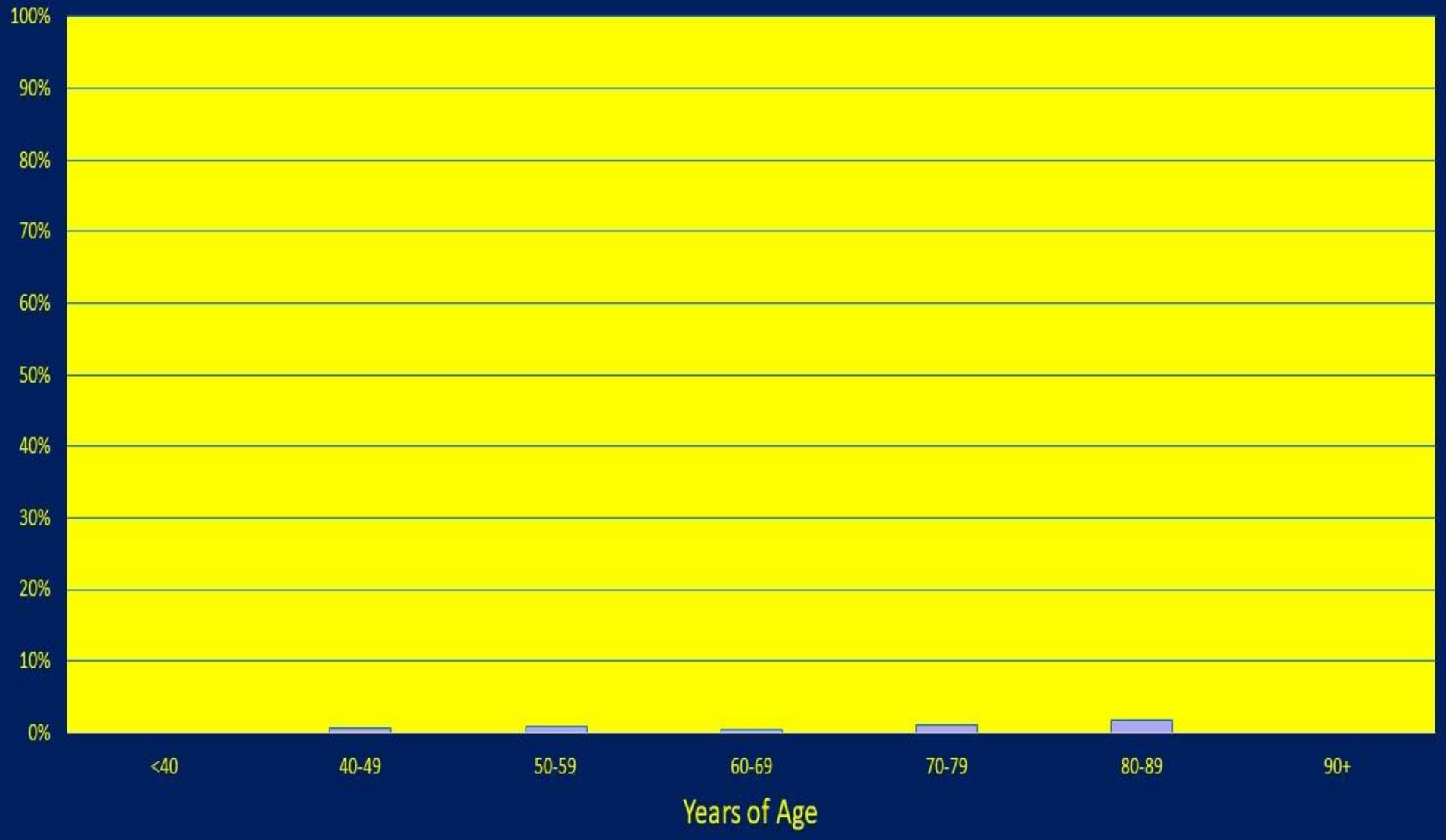


P-value*	n	Variable	MV repair better	MV replacement better
0.63	831	Age < 65 yrs		
	646	Age 65-74 yrs		
	445	Age ≥ 75 yrs		
0.57	1408	Male gender		
	514	Female gender		
0.030	745	HTN		
	1174	No HTN		
0.002	132	Diabetes		
	1787	No diabetes		
0.34	703	Dyslipidemia		
	1216	No dyslipidemia		
0.31	698	Smoking		
	1220	No smoking		
0.57	1250	NYHA I-II		
	672	NYHA III-IV		
0.60	1471	LVEF > 60%		
	427	LVEF < 60%		
0.75	538	A. Fib.		
	1384	No A. Fib.		
0.76	493	PHT		
	1405	No PHT		
0.87	1299	LVESD ≤ 40 mm		
	393	LVESD > 40 mm		
0.26	886	LA diam. ≤ 50 mm		
	763	LA diam. > 50 mm		
0.083	363	Inclusion < 1995		
	798	Inclusion 1995-2000		
	761	Inclusion > 2000		

0.25 0.50 1.00 2.00 4.00

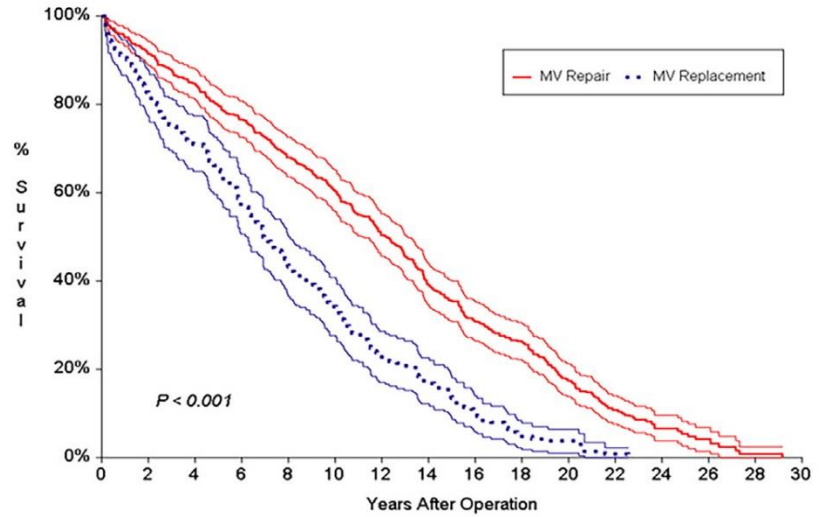
Hazard ratio

Influence of Age on Perioperative Mortality in 2320 Mitral Repairs



Superiority of Mitral repair over replacement in patients over 65 years.Almost all patients followed until death

Kurlansky et al Ann Thorac Surg 2023;116:736-43



Number at risk	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
MV Repair	420	385	355	322	286	254	212	164	129	104	61	29	13	5	1	0
MV Replacement	204	169	145	117	88	69	46	35	20	9	7	1	0	0	0	0

Kurlansky et al Ann Thorac Surg 2023;116:736-43 Cox analysis

TABLE 3 Cox Regression of Variables Influencing Late Mortality Combined Propensity Score-Matched Elderly Patients Undergoing Isolated Mitral Valve Surgery

Predictor Variables	Regression Coefficient	SE	Hazard Ratio	95% CI	*P* Value[a]
Preoperative					
Age at operation	0.075	0.009	1.08	1.06-1.10	<.001
Diabetes mellitus	0.505	0.128	1.66	1.29-2.13	<.001
Peripheral artery disease	0.636	0.183	1.89	1.32-2.70	.001
Congestive heart failure	0.211	0.085	1.24	1.05-1.46	.013
Abnormal ejection fraction	0.353	0.088	1.42	1.20-1.69	<.001
Intraoperative					
Mitral valve replacement	0.585	0.096	1.79	1.49-2.16	<.001
Postoperative					
Gastrointestinal	0.641	0.225	1.90	1.22-2.95	.009

Choice of Surgeon

Selection Criteria-role of volume

STS-ACSD provides objective evidence of importance of minimum acceptable case volumes on repair rate and hospital mortality.

Choice of Surgeon: STS ACSD Data from 87,214 Mitral Surgeries:2011-2016

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(Ann Thorac Surg 2018;106:716–27)

- **Repair rate**:overall-66%
  - -degenerative path-83%
- **O/A Mortality**: repair -1.1%
  - replacement-3.7%
- **Average center volume** - 3 pa.
- **Repair rate related to volume** -
  - 3 cases p.a : 56%
  - > 23 cases p.a. (4.7% of centers) 92% repair rate

Choice of surgeon :Effect of Hospital Volume on MV Repair Mortality. STS ACSD 2023 O/A mortality<1%

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Risk of Surgical Mitral Valve Repair for Primary Mitral Regurgitation

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TABLE 3 Annualized Hospital Volume-Based Outcomes of Intent-to-Treat Mitral Valve Repair for Primary Mitral Regurgitation

Annual Hospital Volume	Hospitals	Cases	Mortality	Morbidity/Mortality	Converted to Replacement
≥50	29	14,696	82 (0.56)	942 (6.41)	304 (2.07)
25-49	58	11,194	86 (0.77)	894 (7.99)	536 (4.79)
10-24	166	14,085	176 (1.25)	1,287 (9.14)	983 (6.99)
<10	628	13,487	275 (2.04)	1,623 (12.00)	1,576 (11.70)
Overall	**881**	**53,462**	**619 (1.60)**	**4,671 (8.74)**	**3,399 (6.36)**

Values are n or n (%). **Bold** indicates subtotals.

- >50 cases pa:
  periop mort 0.56%
- < 10 cases pa:
  periop mort 2.04%
- Median no. cases pa- 5
- Only 3.7% of hospitals (29/881) did >50/pa

Choice of Surgical Techniques for Mitral Valve Repair: Importance of 100% Repair Rate

-**"Classic" Carpentier techniques** (rigid, semi-rigid rings, leaflet resection) are obsolete.

Still the most widely used and taught.

Still problems worldwide with the “Classic” Carpentier principles of resection and rigid D-rings despite 53 years of experience

-Low repairability rates.

-SAM -Mitral stenosis.

-Early re-operations (<1 year)

-Poor durability especially of anterior and bi-leaflet repairs. 2-4 X greater risk of failure .

-Adverse effects on LV flow patterns and energetics.

Mayo Clinic 2021,Incidence of SAM 13%

Risk factors and progression of systolic anterior motion after mitral valve repair

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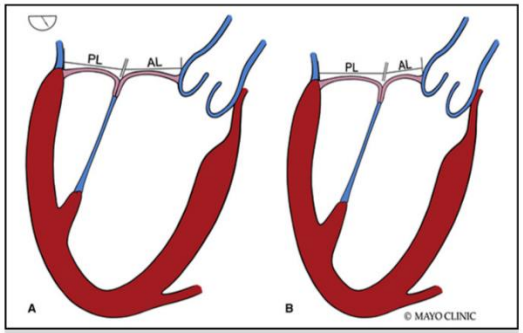
ABSTRACT

Objectives: The phenomenon of systolic anterior motion (SAM) of the mitral valve (MV) was discovered 50 years ago, but to date only a few studies have identified risk factors for SAM following mitral repair. There are limited data on the necessity of surgical reintervention on the MV once SAM is discovered by intraoperative transesophageal echocardiography. We sought to identify predictors of SAM in a large cohort of consecutive patients, assess the rate of early reintervention on the MV to address SAM, and follow the progression of SAM postdischarge.

Methods: Analysis of electronically stored echocardiographic exams of adults who underwent MV repair in a recent decade.

Results: Following MV repair, the incidence of SAM immediately after cardiopulmonary bypass was 13% (98 of 761 patients). Multivariable analysis revealed several preoperative risk factors of SAM development and progression, including a lower ratio of anterior to posterior leaflets heights, younger age, lower end-systolic left ventricular volume, presence of bileaflet prolapse, and male sex. SAM was managed conservatively in 91 patients (93%) and surgically in 7 patients (7%). In a majority of patients (70 of 98 patients [71%]) SAM resolved before hospital discharge.



Echocardiographic predictors of SAM after mitral valve repair.

CENTRAL MESSAGE

Younger male patients with bileaflet prolapse, lower ratio of anterior to posterior leaflets heights, and lower end systolic left ventricular volume are at risk

ADULT

Reoperation after mitral valve repair at Cleveland Clinic. Early failures, (<1 Year),26% of re-operations. (Moore RA,et al J Thorac Cardiovasc Surg,2022). Overall incidence not reported.

Early causes:

-Suture/annuloplasty dehiscence.

-SAM.

-Hemolysis.

-Ventricular remodelling.

Late causes:

Disease progression.

Fibrosis.

Mayo Clinic, Suri et al JACC 2016. Posterior vs Anterior and bi-leaflet repair. HR 2-2.9

	Univariate Analysis		Multivariate Analysis	
	HR (95% CI)	p Value	HR (95% CI)	p Value
Age	1.02 (1.01-1.04)	0.001	1.02 (1.01-1.03)	0.01
Male	1.01 (0.69-1.47)	0.98	1.13 (0.76-1.66)	0.67
Surgery before 1996	1.70 (1.19-2.40)	0.003	1.52 (1.06-2.19)	0.02
Hypertension	1.74 (1.23-2.45)	0.002	1.57 (1.09-2.24)	0.02
Bypass time >90 min	2.15 (1.50-3.04)	<0.0001	1.73 (1.19-2.50)	0.004
Residual mild MR in the OR	3.99 (1.79-7.65)	0.002	4.23 (1.86-8.32)	0.001
Resection	0.48 (0.34-0.68)	<0.0001	0.70 (0.48-1.04)	0.07
Annuloplasty	0.31 (0.18-0.59)	0.0008	0.33 (0.18-0.63)	0.002
Localization		<0.0001		0.0002
Anterior vs. posterior	2.87 (1.81-4.48)	<0.0001	2.57 (1.54-4.22)	0.0005
Bileaflet vs. posterior	2.03 (1.37-2.99)	0.0003	2.00 (1.33-2.99)	0.001

Cleveland Clinic ,2018 . 6.2% vs 11% for posterior repair vs anterior or bi-leaflet repair.

Simple versus complex degenerative mitral valve disease

Check for updates

Hoda Javadikasgari, MD,[a] Tomislav Mihaljevic, MD,[a] Rakesh M. Suri, MD, DPhil,[a] Lars G. Svensson, MD, PhD,[a] Jose L. Navia, MD,[a] Robert Z. Wang, MD,[a] Bassman Tappuni, MD,[a] Ashley M. Lowry, MS,[b] Kenneth R. McCurry, MD,[a] Eugene H. Blackstone, MD,[a,b] Milind Y. Desai, MD,[c] Stephanie L. Mick, MD,[a] and A. Marc Gillinov, MD[a]

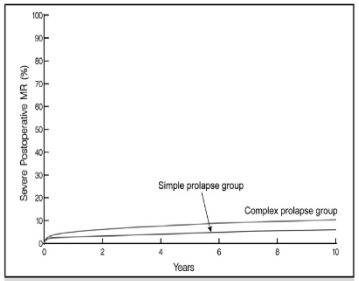
ABSTRACT

Objectives: At a center where surgeons favor mitral valve (MV) repair for all subsets of leaflet prolapse, we compared results of patients undergoing repair for simple versus complex degenerative MV disease.

Methods: From January 1985 to January 2016, 6153 patients underwent primary isolated MV repair for degenerative disease, 3101 patients underwent primary isolated MV repair for simple disease (posterior prolapse), and 3052 patients underwent primary isolated MV repair for complex disease (anterior or bileaflet prolapse), based on preoperative echocardiographic images. Logistic regression analysis was used to generate propensity scores for risk-adjusted comparisons (n = 2065 matched pairs). Durability was assessed by longitudinal recurrence of mitral regurgitation and reoperation.

Results: Compared with patients with simple disease, those undergoing repair of complex pathology were more likely to be younger and female (both *P* values < .0001) but with similar symptoms (*P* = .3). The most common repair technique was ring/band annuloplasty (3055/99% simple vs 3000/98% complex; *P* = .5), followed by leaflet resection (2802/90% simple vs 2249/74% complex; *P* < .0001). Among propensity-matched patients, recurrence of severe mitral regurgitation 10 years after repair was 6.2% for simple pathology versus 11% for complex pathology (*P* = .007), reoperation at 18 years was 6.3% for simple pathology versus 11% for complex pathology, and 20-year survival was 62% for simple pathology versus 61% for complex pathology (*P* = .6).

Conclusions: Early surgical intervention has become more common in patients with degenerative MV disease, regardless of valve prolapse complexity or symptom status. Valve repair was associated with similarly low operative risk and time-related survival but less durability in complex disease. Lifelong annual echocardiographic surveillance after MV repair is recommended, particularly in patients with complex disease. (J Thorac Cardiovasc Surg 2018;156:122-9)



Temporal trend of severe postoperative mitral regurgitation (*MR*) after mitral valve repair.

Central Message

Degenerative mitral valve repair operations have become increasingly durable. However, lifelong annual echocardiographic surveillance is recommended, particularly for patients with complex disease.

Perspective

Mitral valve repair for degenerative disease is associated with excellent survival and low operative risk, regardless of valve prolapse complexity. However, repair of complex disease is still less durable and requires lifelong postoperative annual echocardiographic surveillance.

See Editorial Commentary page 130.

David,T 2019- HR 3.92 for re-operation after anterior leaflet repair.

Long-term outcomes of chordal replacement with expanded polytetrafluoroethylene sutures to repair mitral leaflet prolapse

J Thorac Cardiovasc Surg 2019

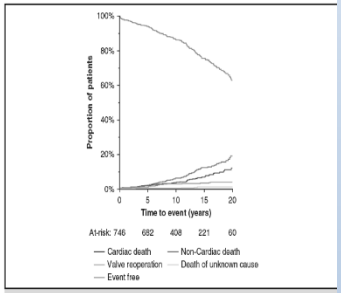
Tirone E. David, MD, Carolyn M. David, BN, Myriam Lafreniere-Roula, PhD, and Cedric Manlhiot, PhD

ABSTRACT

Objectives: This study examines the durability of mitral valve (MV) repair for mitral regurgitation using chordal replacement with expanded polytetrafluoroethylene sutures to correct leaflet prolapse.

Methods: Isolated chordal replacement was used to correct prolapse in 186 (24.9%) patients and combined with leaflet resection in 560 (75.1%). Patients were followed prospectively with periodical clinical and echocardiographic assessments for a median follow-up of 11 years (range, 7-16 years).

Results: Patients' median age was 58 years (range, 48-67 years) and 516 (69.2%) were men. Bileaflet prolapse was present in 63% of patients and advanced myxomatous degeneration was present in 32%. The number of neochords per repaired valve increased over time and was not associated with MV reoperation or recurrent mitral regurgitation. The cumulative incidence of MV reoperation with death as a competing risk was 4.2% (95% confidence interval [CI], 2.4-6.0) at 20 years. Multivariable analysis revealed that previous cardiac operations (hazard ratio, 5.70; 95% CI, 1.96-16.53; $P = .001$), and isolated anterior leaflet prolapse (hazard ratio, 3.92; 95% CI, 1.106-13.91; $P = .034$) were associated with increased hazard of MV reoperation. The probability of recurrent moderate or severe mitral regurgitation using repeated measures regression models was 14.1% (95% CI, 10.3-19.0) at 20 years. Variables associated with recurrent MR in multivariable regression analysis were left ventricular ejection <40% (hazard ratio, 3.57; 95% CI, 1.37-9.32; $P = .009$) and preoperative complete heart block (hazard ratio, 5.90; 95% CI, 2.47-14.09; $P < .001$).



Event-free survival and cumulative incidence of adverse events.

Central Message

Chordal replacement with ePTFE sutures is effective and durable technique of correction of mitral valve leaflet prolapse.

Perspective

Chordal replacement with ePTFE sutures to correct mitral valve leaflet prolapse either isolated or in combination with leaflet resection allows for repair of valves that otherwise would be replaced. The long-term results of this approach are excellent with low probability of reoperation on the mitral valve and recurrent mitral regurgitation.

Cedars Sinai,LA. 2022. HR 3.04 Posterior leaflet (9%), vs. anterior leaflet or bileaflet (17%): (Roach A et al Ann Thorac Surg 2022;114:84-90. Cedars –Sinai. LA).

TABLE 4 Factors Associated with >2+ Residual or Recurrent Mitral Regurgitation

Parameter	Value	*P* Value	Hazard Ratio	95% CI
Prolapse location	Anterior or bileaflet	.0096	3.04	1.311-7.053
Female	No	.018	3.734	1.254-11.123
Surgery Year	...	.0113	1.274	1.056-1.536
Age	...	.0182	1.048	1.008-1.09

CI, confidence interval.

Importance?

Anterior leaflet involvement occurs in 1/3 of patients.

American Correction produces identical early and late results in all subgroups.

Carpentier technique based on autopsies of 100 diseased hearts and 50 normal controls. No echo.

(Carpentier A,La valvuloplastie reconstitutive. Presse med 77:7,1969)

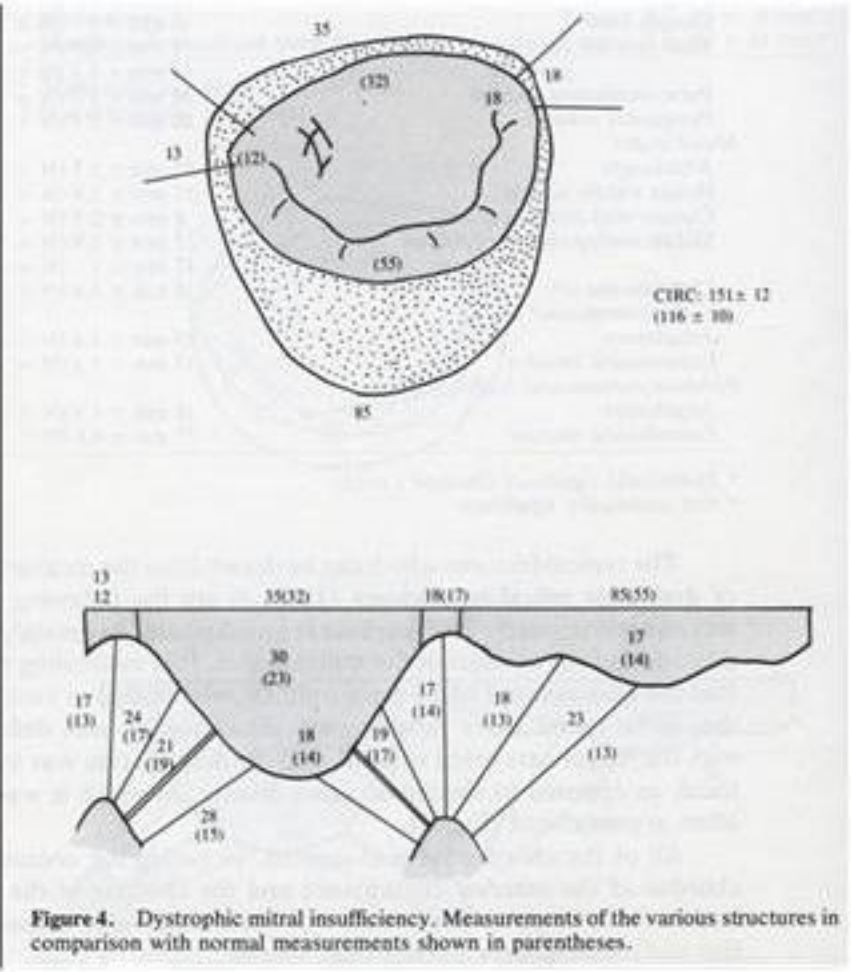


Figure 4. Dystrophic mitral insufficiency. Measurements of the various structures in comparison with normal measurements shown in parentheses.

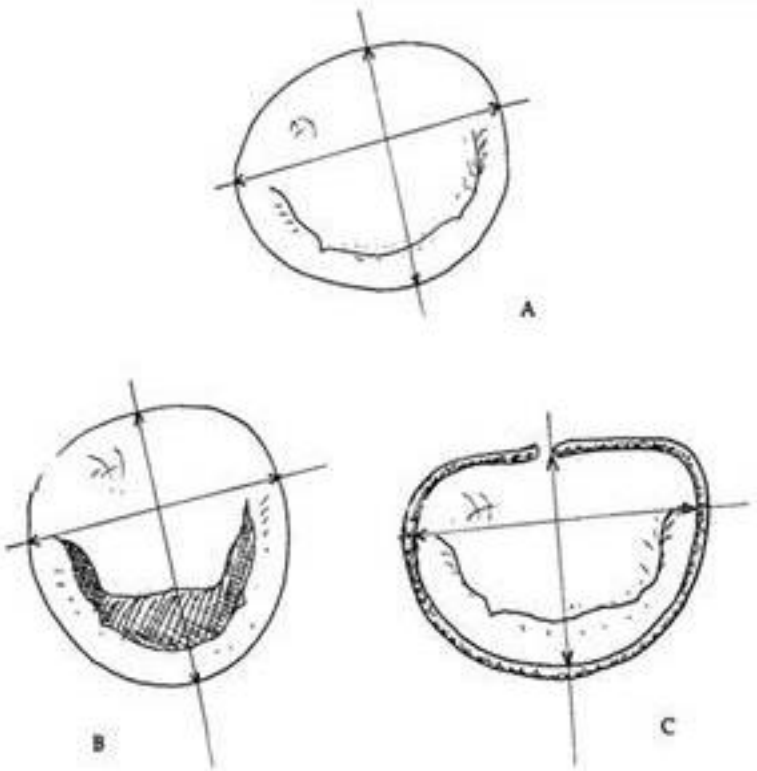


Fig. 8. Rationale of the concept of remodeling annuloplasty. A, Characteristic 3 : 4 ratio between anteroposterior and transverse diameters of a normal mitral valve orifice during systole. B, Ratio is inverted in mitral valve incompetence. C, Remodeling ring annuloplasty restores physiologic ratio with maximum orifice area.

Mitral Valve Repair by Leaflet Resection and Rigid Annuloplasty Ring. (Carpentier,A, Presse med 77:7,1969).

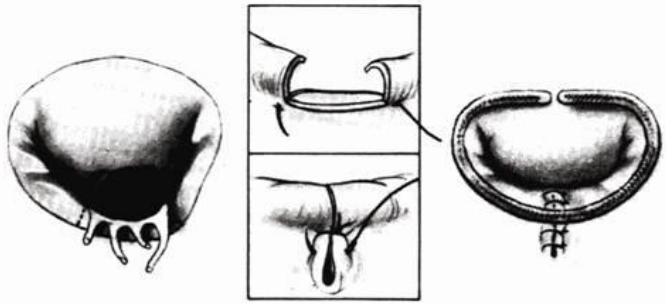


Fig. 9. Repair of mural leaflet prolapse by extensive rectangular resection.

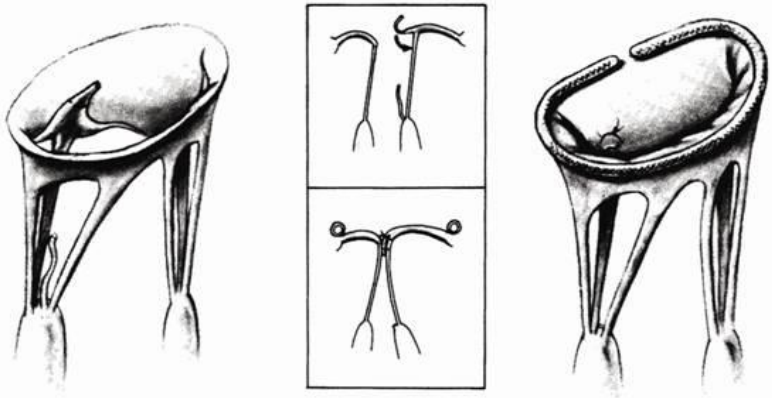
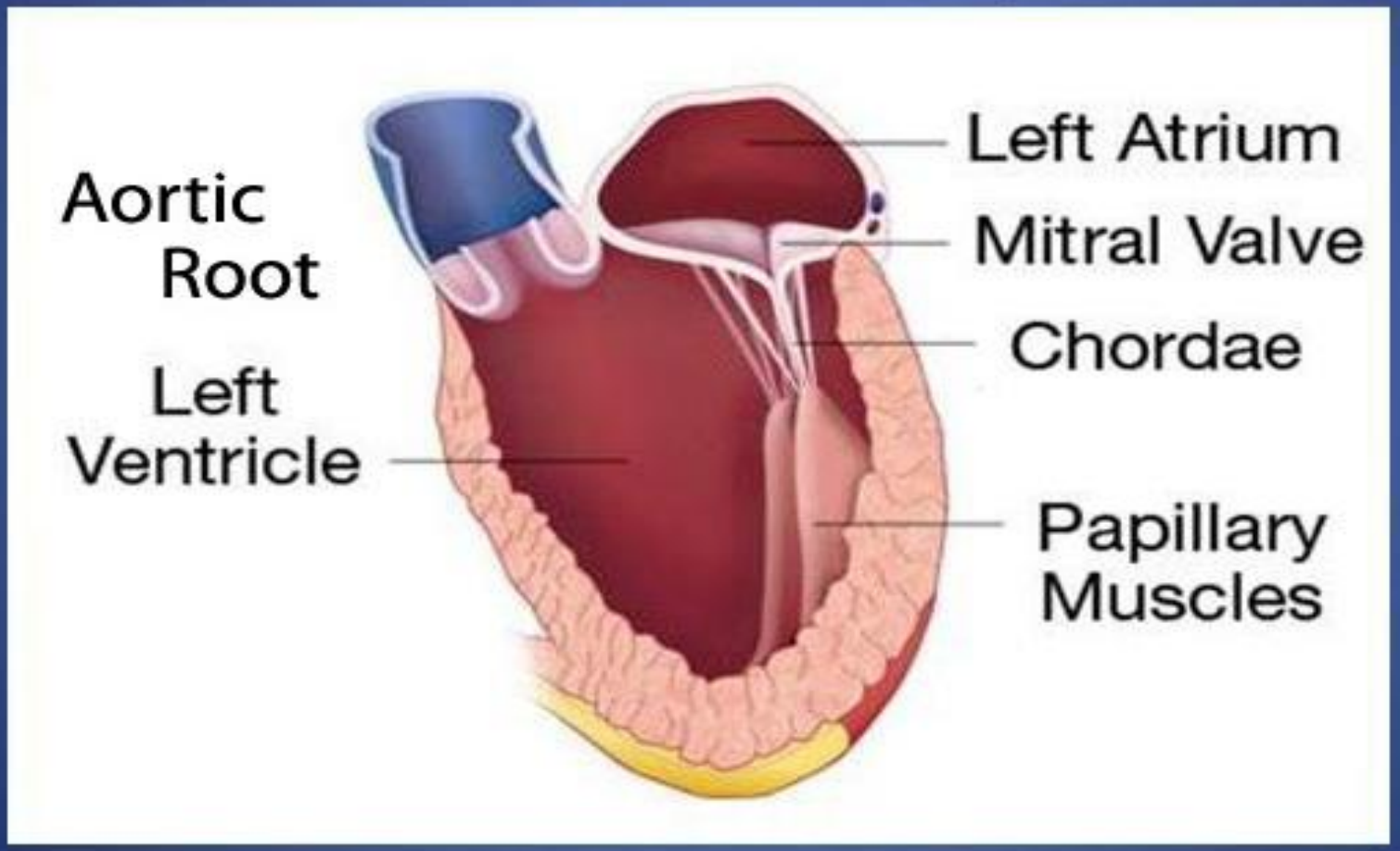


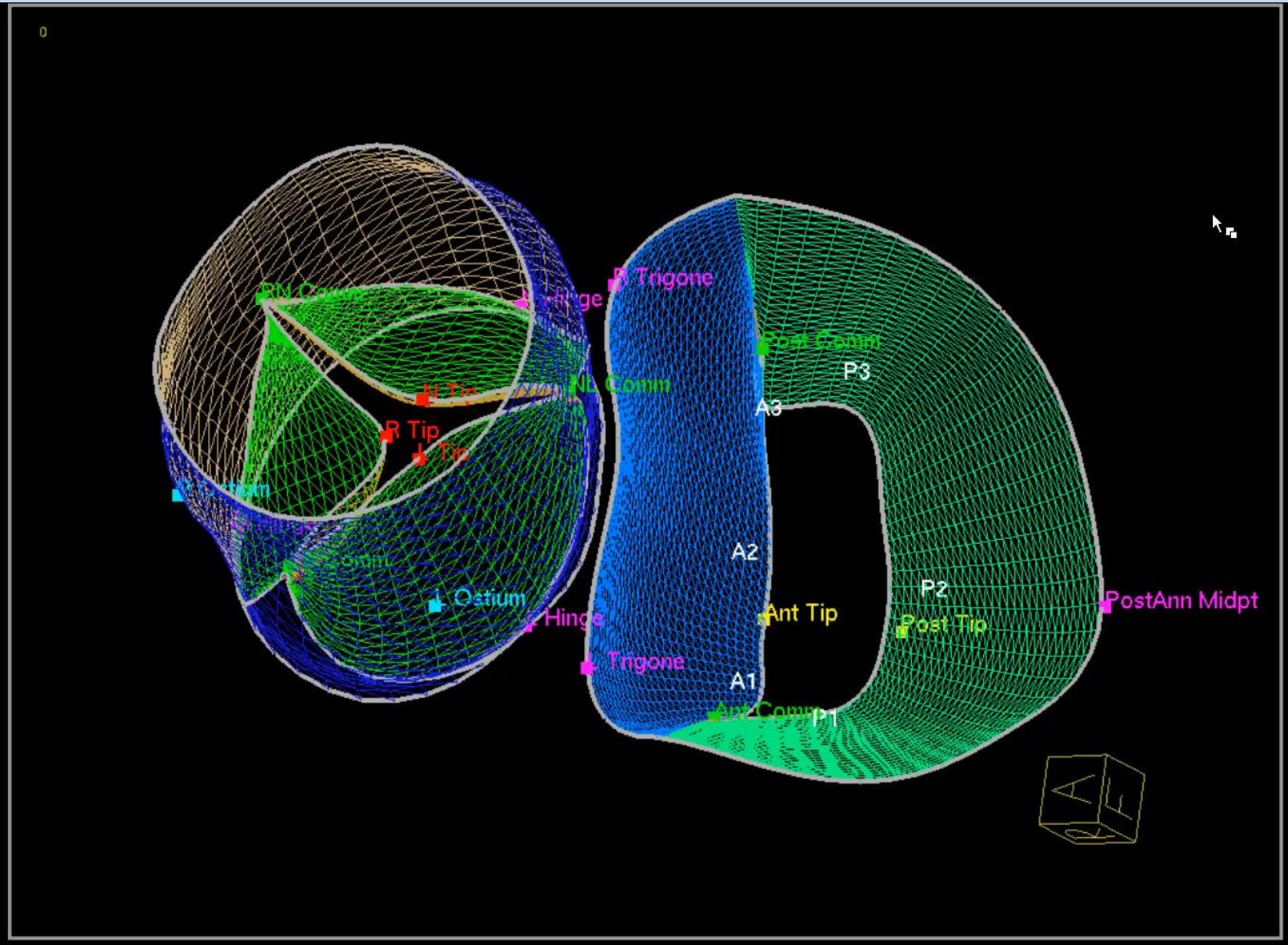
Fig. 10. Repair of anterior leaflet prolapse due to chordal rupture by leaflet fixation on a secondary chorda (see text). Carpentier,A,J Thoracic Cardiovasc Surg.86:323,1983

Importance of Integrated Dynamic Cardiac Function for Normal Mitral Valve Function

Mitral apparatus Modified from Perloff,Roberts Circ 1972;46:227-239

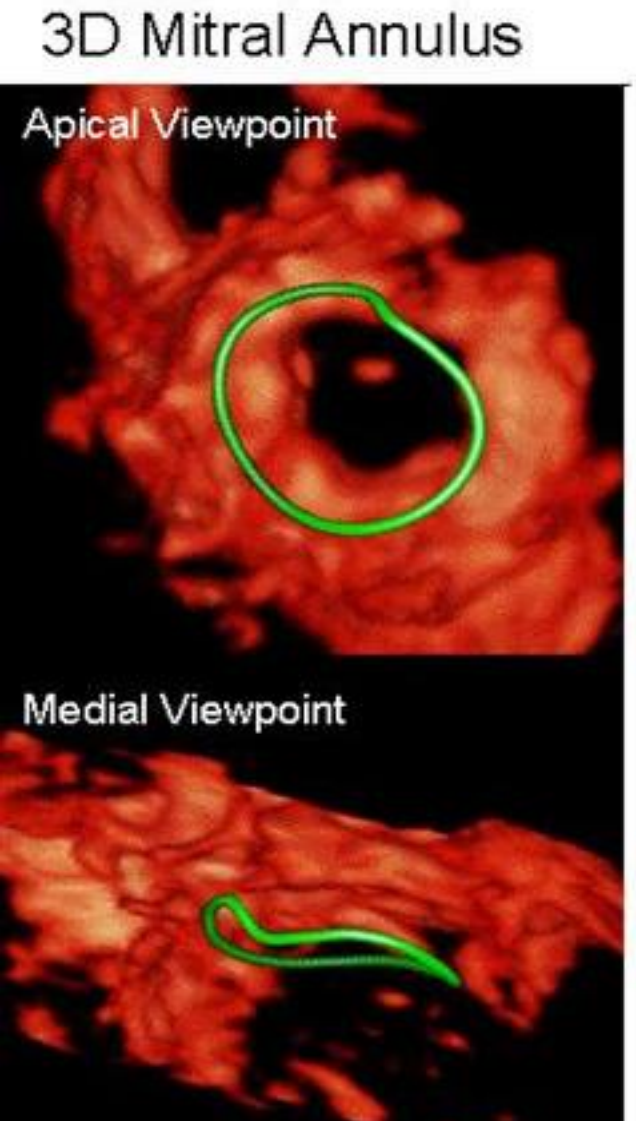


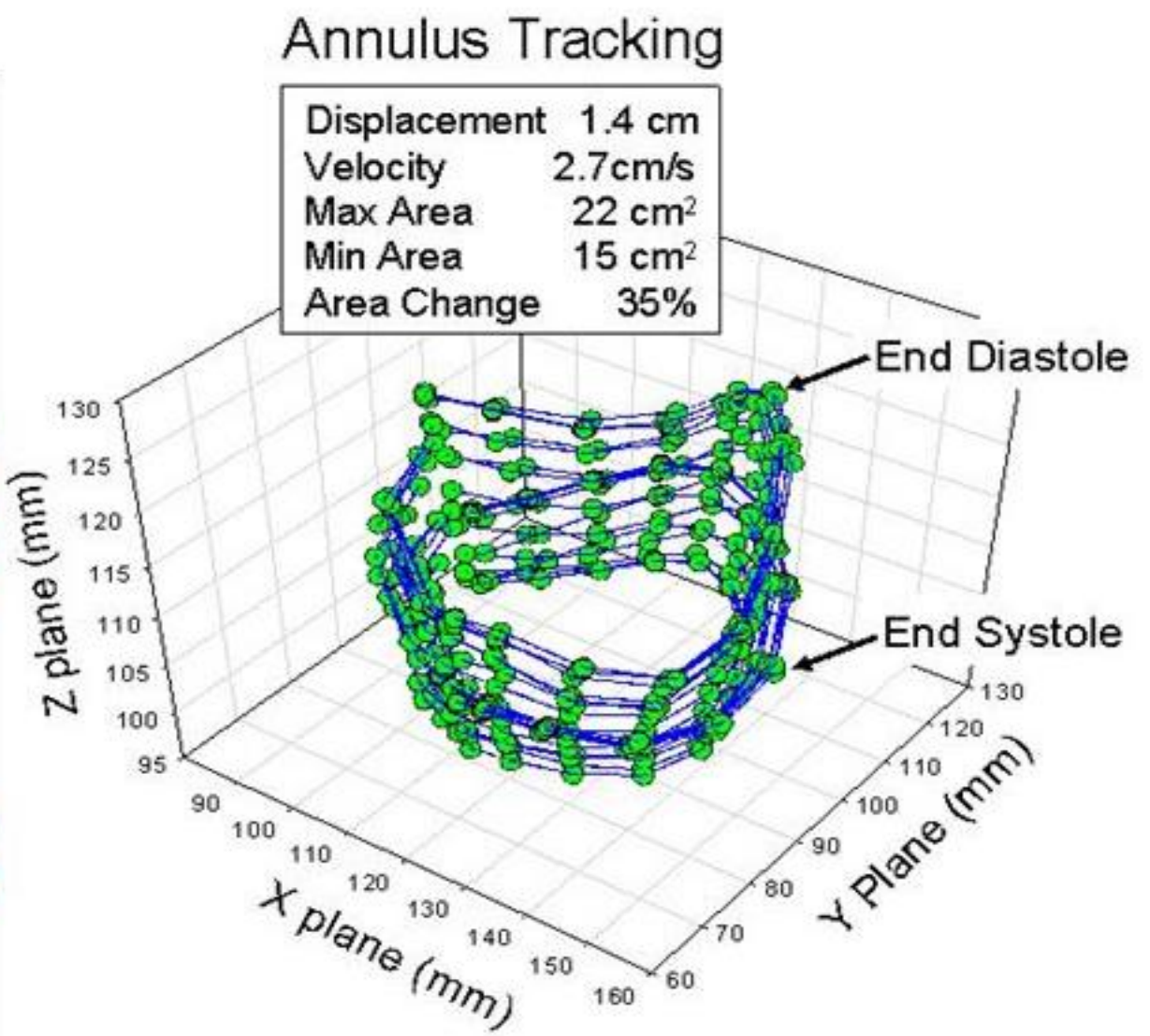
Dynamics of aortic - mitral coupling



Aortic root expansion and rotation(right) displaces anterior leaflet posteriorly into posterior leaflet(left)

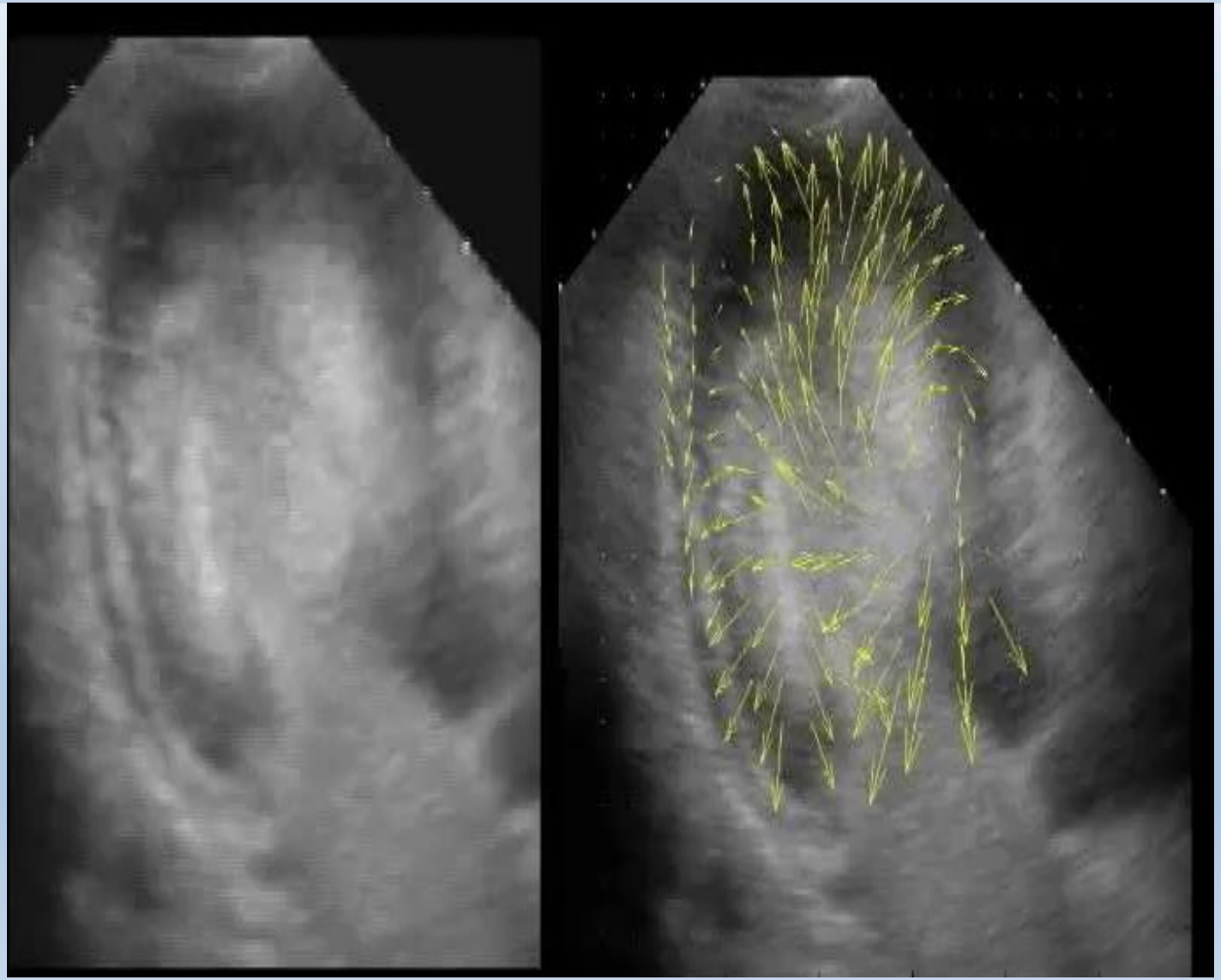
Mitral annular dynamics (Little et al JASE 2010;23:872-9)





LV Vortex: Speckle Flow Tracking

Hong,GR et al, JACC Imaging,2008;1:705-717



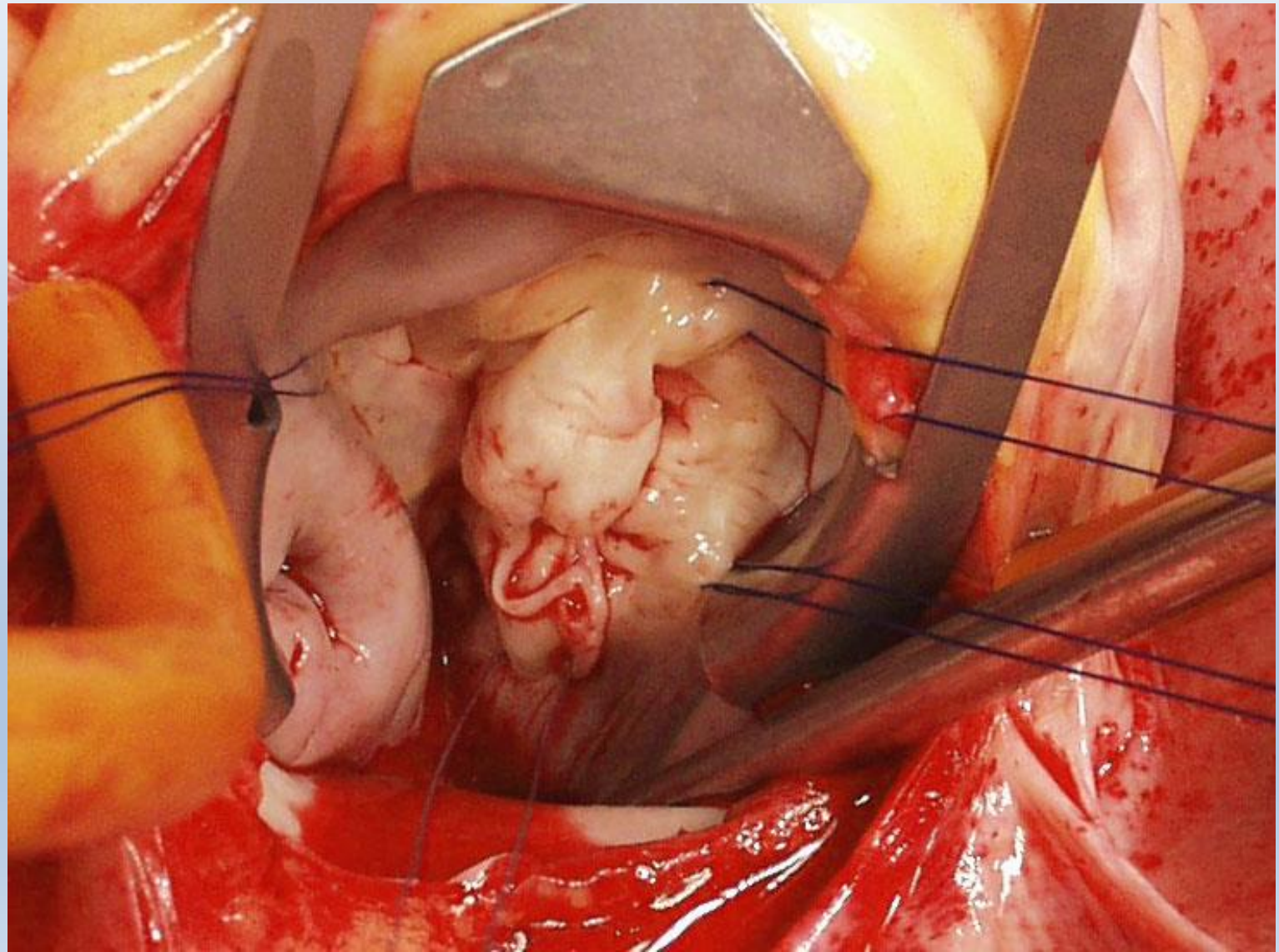
American Correction : A Physiological Leaflet Preserving Restoration of Normal Function

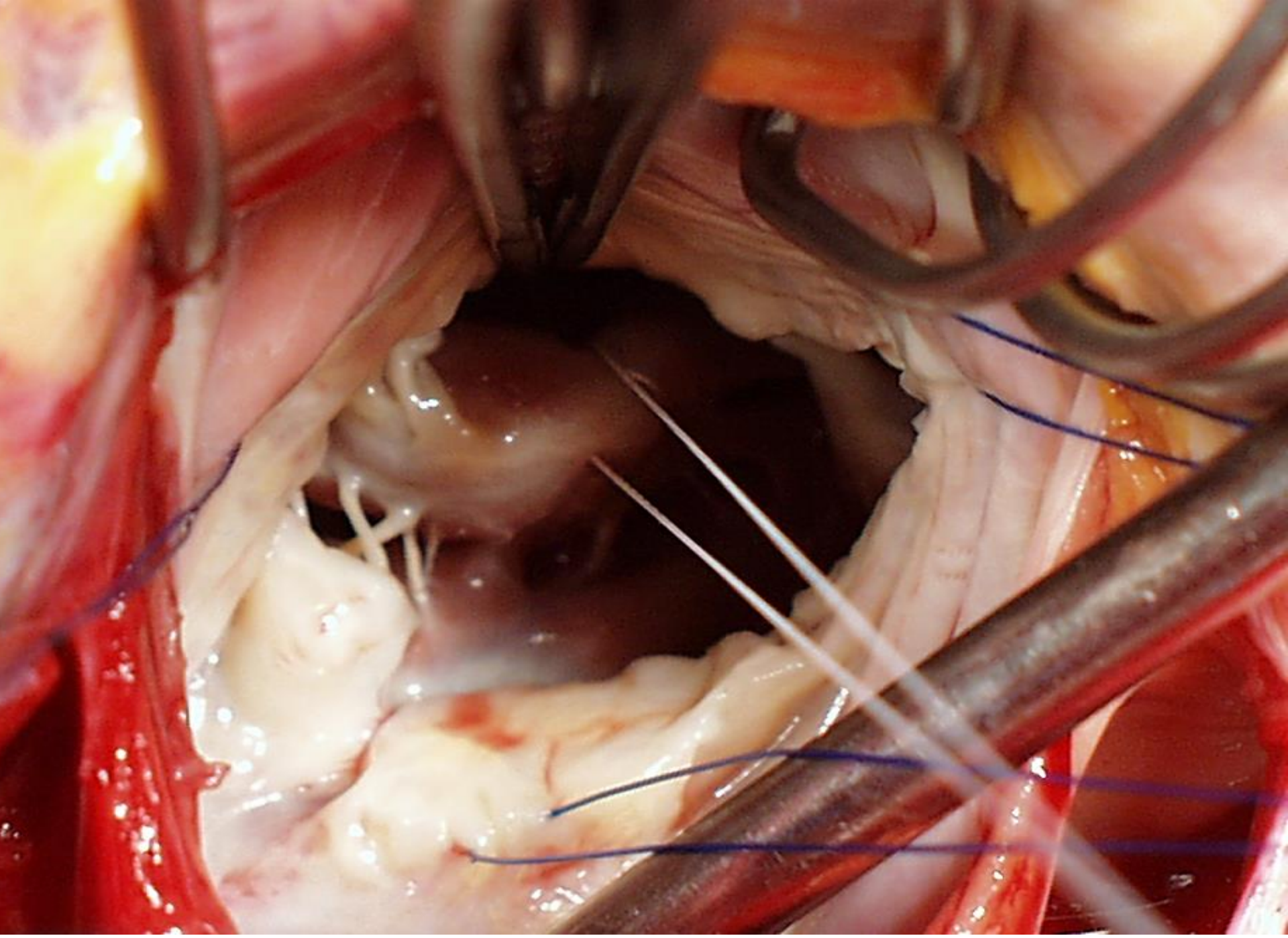
-**Dynamic simulation** of **“mitral diastolic locking”**uses **pressurized saline** to rapidly distend the LV, LVOT and aortic root to simulate the early isovolumic systolic state.

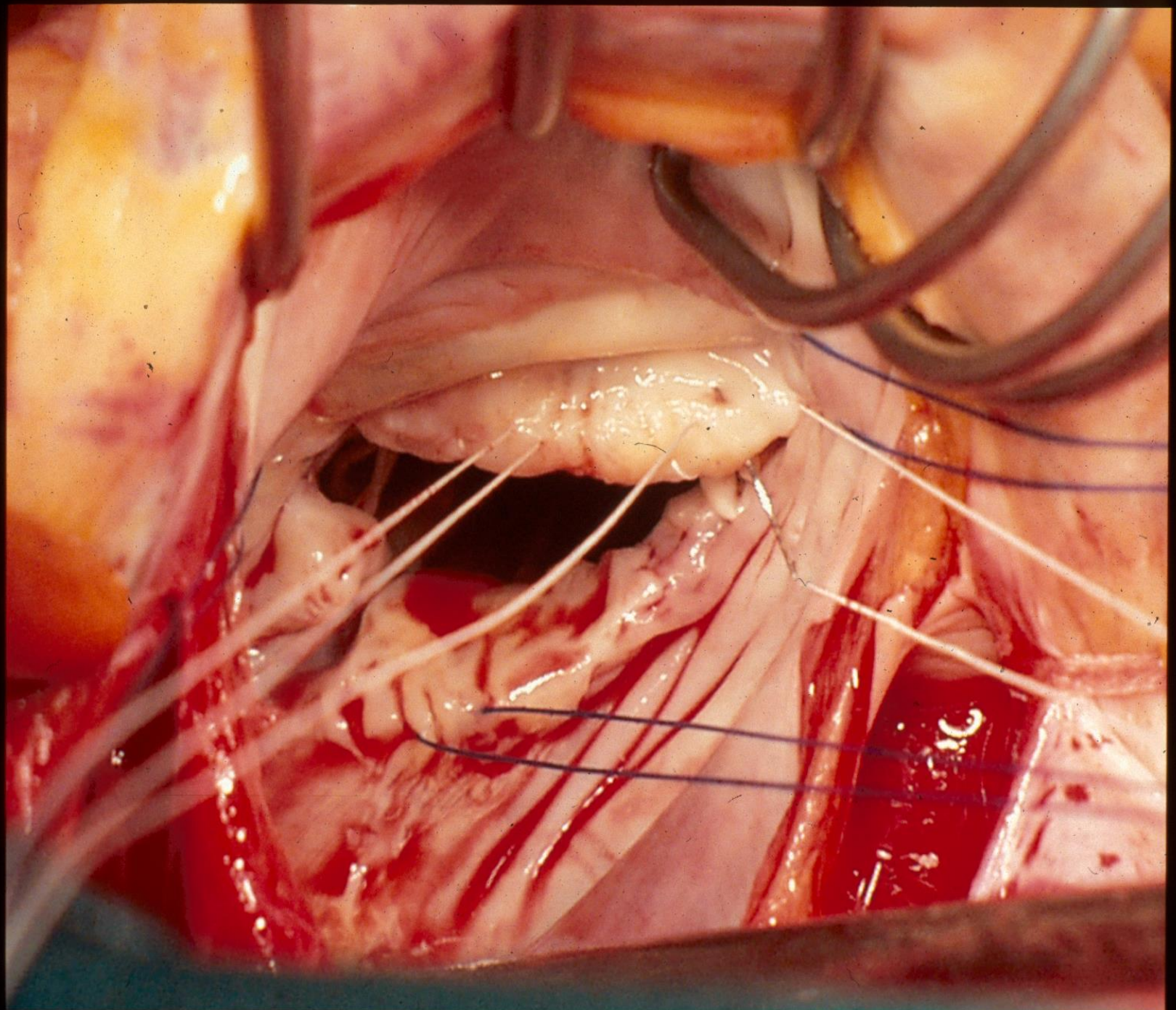
-No leaflet resection

-Complete, flexible adjustable ring, PTFE neochordae

American Correction of Large Flail Myxomatous Anterior Mitral Leaflet

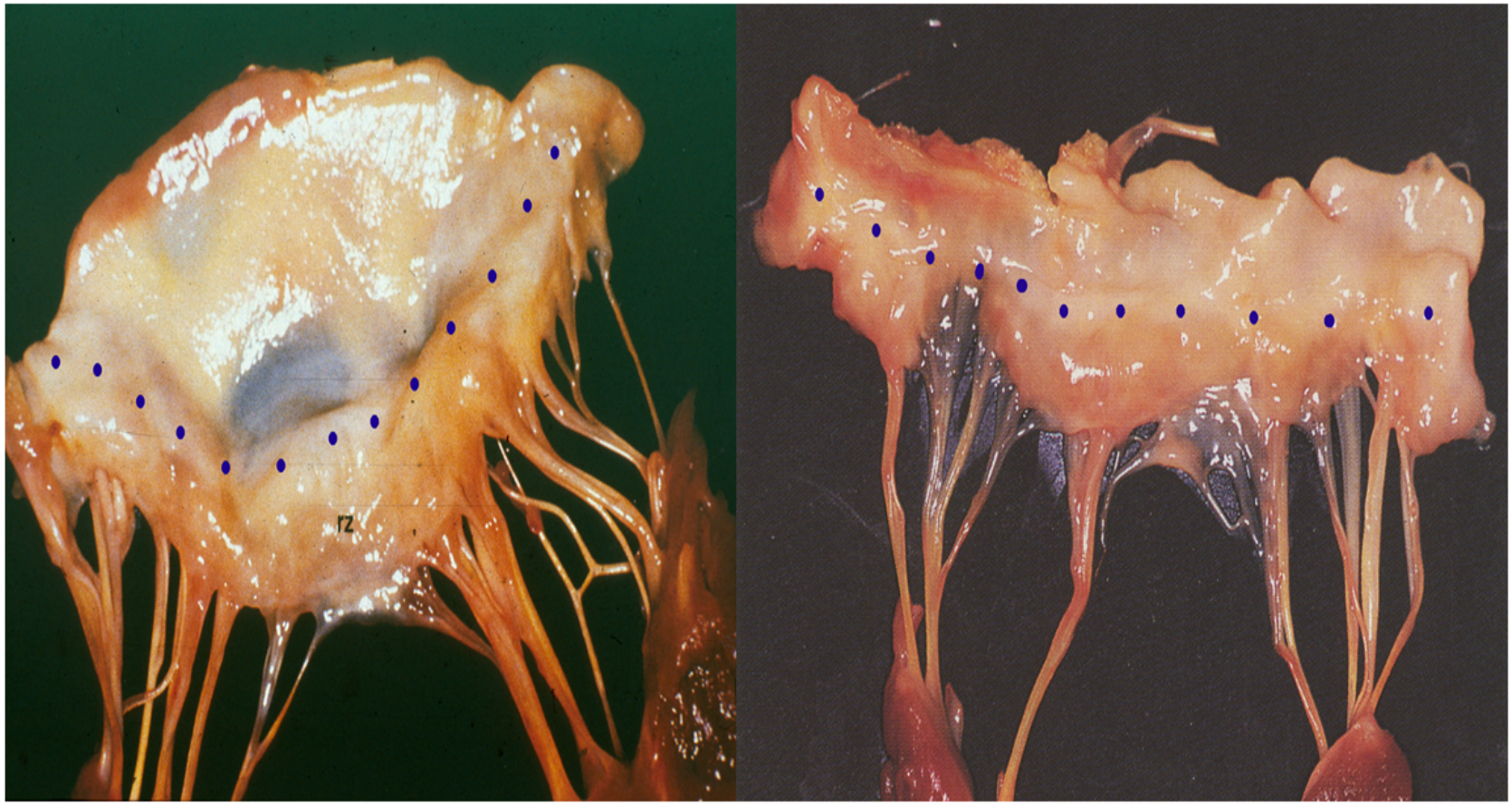




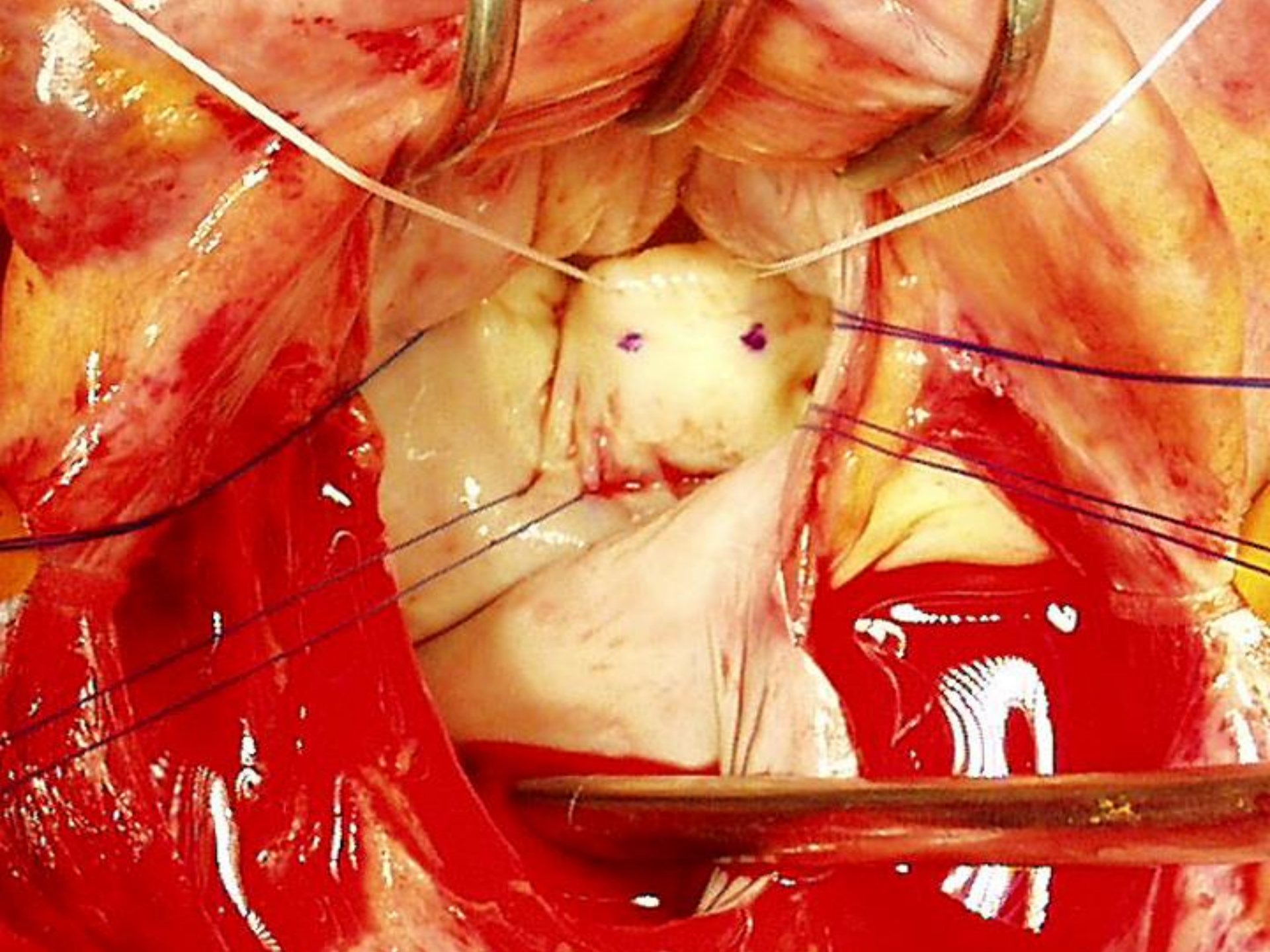


Marking of zone of apposition with dots

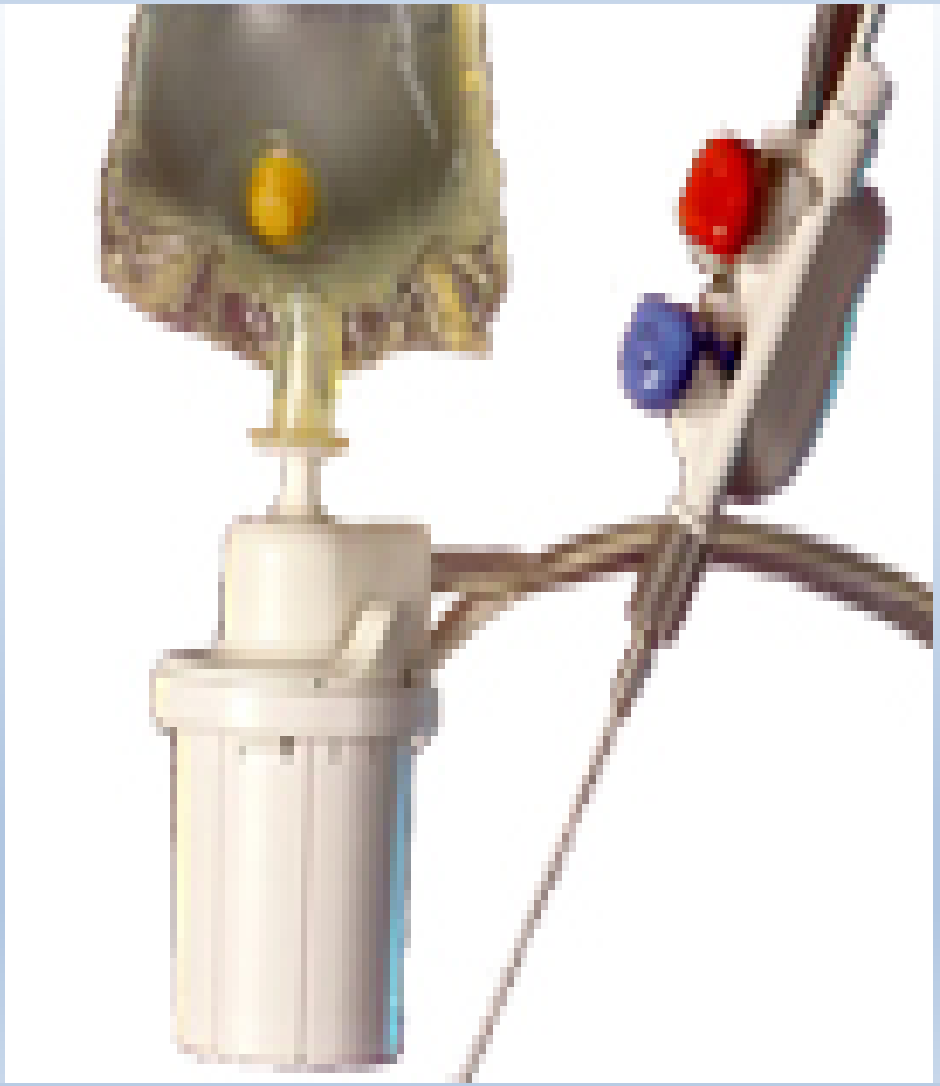
Modified from Antunes, MJ,1989



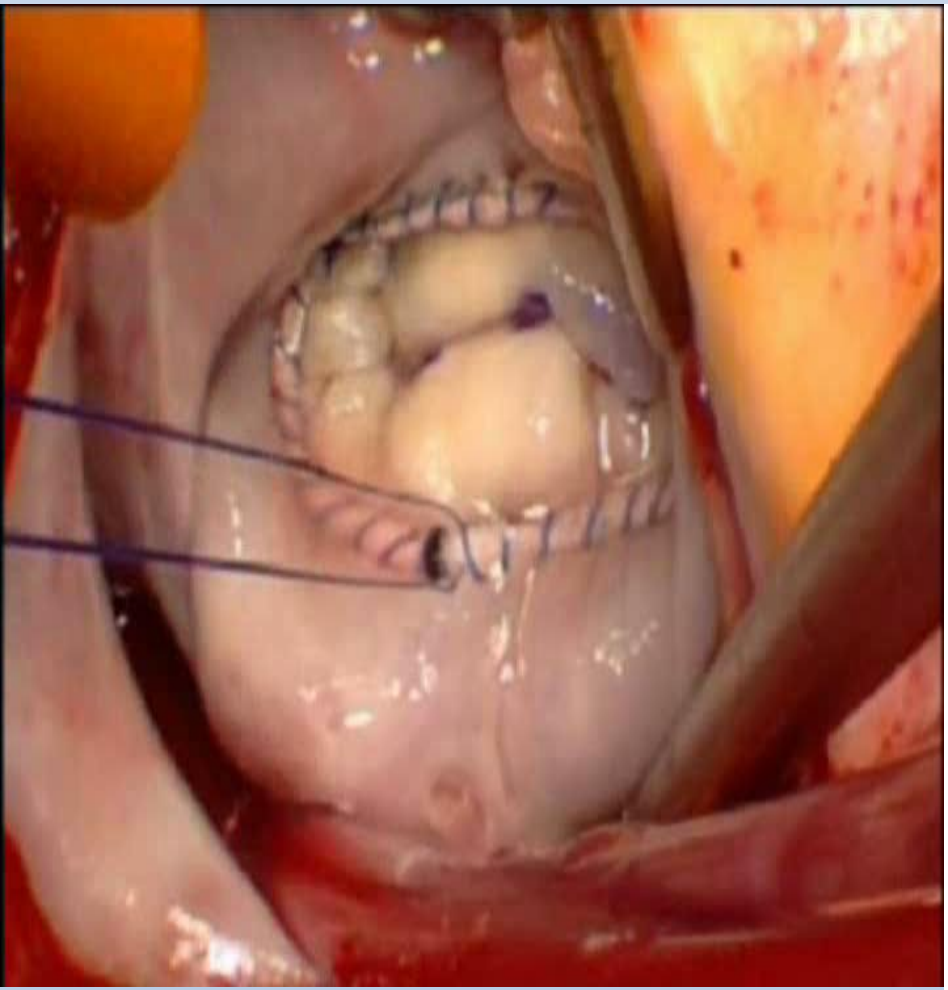
Anatomic Position of Dots Marking Zone of Apposition



Suction –Irrigator 4l/min-used to simulate mitral diastolic locking



Progressive Leaflet Apposition and Anterior Annular Elevation- Simulated Diastolic Mitral Locking and early isovolumic systole

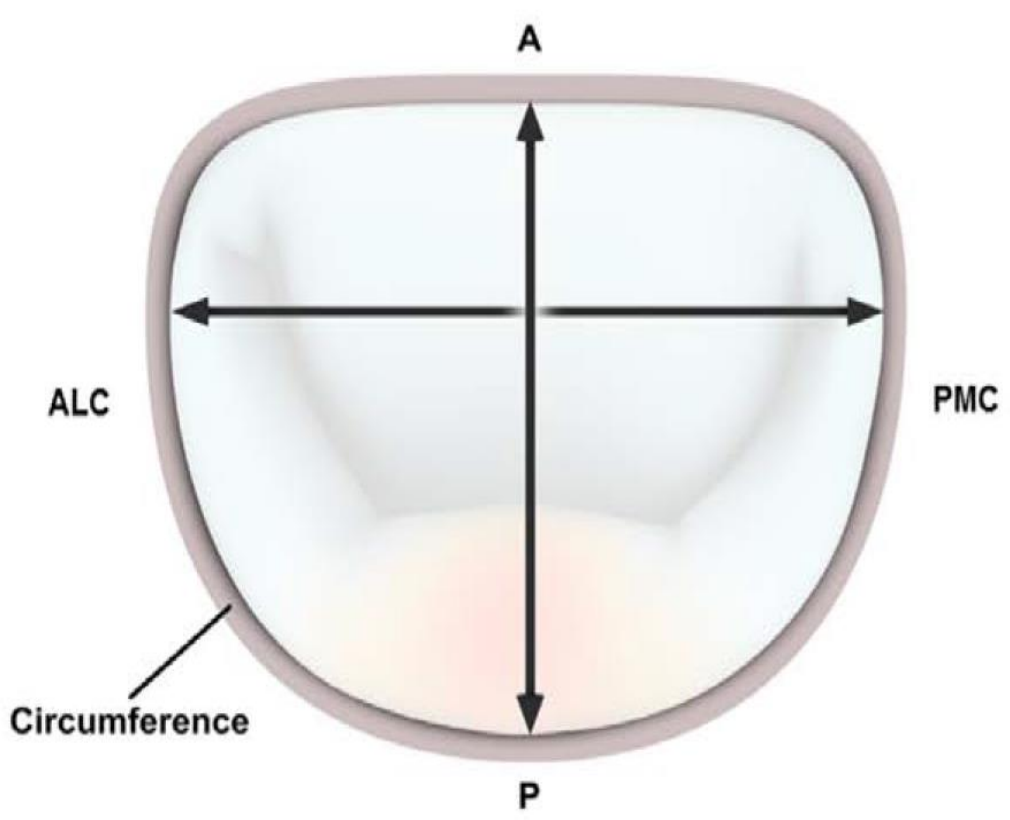


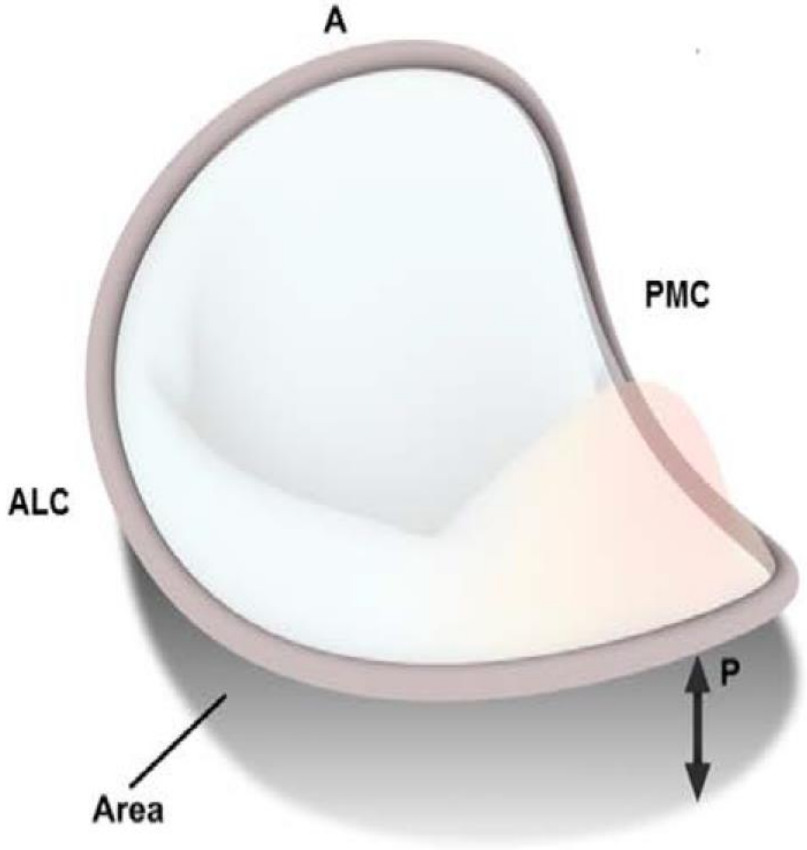
Diastolic "Locking" of the Mitral Valve: The Importance of Atrial Systole and Intraventricular Volume

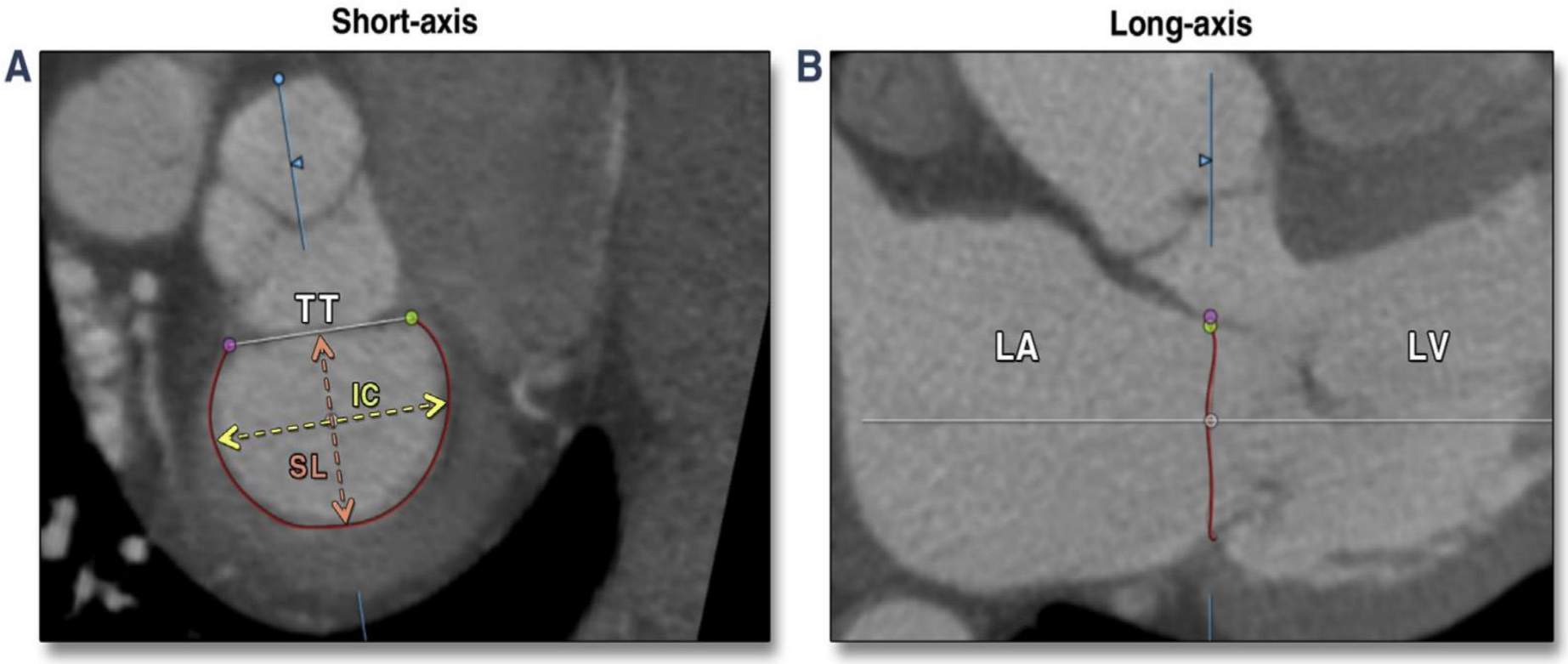
DANIEL DAVID, M.D., ERIC L. MICHELSON, M.D., MASAHITO NAITO, M.D., CHIN C. CHEN, M.D., MARK SCHAFFENBURG, AND LEONARD S. DREIFUS, M.D.

SUMMARY Diastolic mitral valve "locking," defined as sustained diastolic closure of the mitral valve after atrial systole, was investigated by simultaneous hemodynamic and echocardiographic recordings during a protocol of programmed pacing in six dogs with surgically induced atrioventricular block. Atrial extrasystoles were introduced at progressively increasing coupling intervals during programmed prolonged pauses in ventricular pacing. As the coupling interval of the atrial extrasystole was increased, both the mitral reopening time (MRT) and the calculated left ventricular volume (LVV) at the end of the MRT increased proportionally. These interrelations could be best expressed by a general logarithmic function of the form $y = a + b \ln(x)$, where x = the coupling interval of the atrial extrasystole and y = the MRT or the LVV. Correlations between the measured data and the predicted data were excellent ($r \geq 0.95$). In each dog, a specific LVV had to be attained to allow a diastolic "locking" of the mitral valve. Atrial standstill and atrial fibrillation were also induced in each dog to study the relative role of atrial systole in locking of the mitral valve. During either atrial standstill or atrial fibrillation, the mitral valve closed transiently, but did not lock, despite the accumulation of a LVV larger than the LVV necessary to lock the valve during sinus rhythm. Thus, diastolic locking of the mitral valve has several determinants, including the presence of active atrial systole and the accumulation of a sufficient intraventricular volume. Circ 1983 ,67:640

Mitral annulus IN VIVO is never D- shaped. When viewed en-face from above as in autopsy material it appears to be D-shaped. (Antoine C et al Circ CV Imaging 2018)

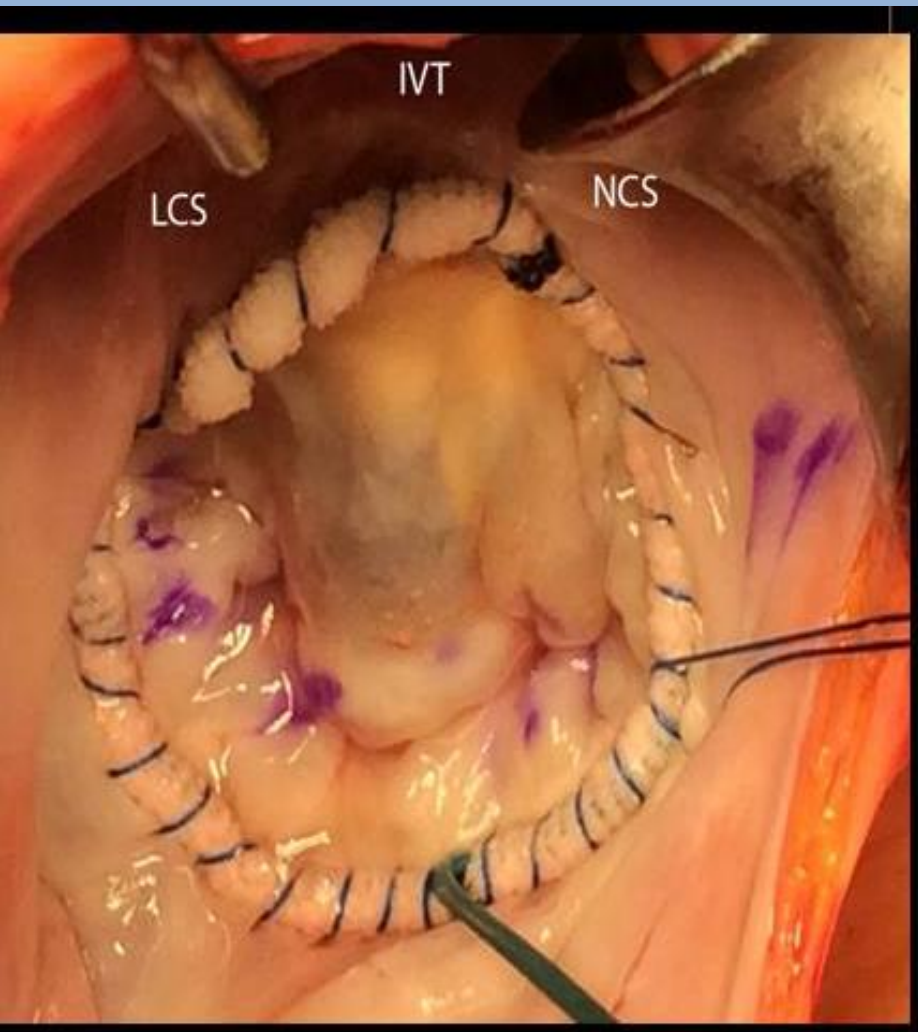


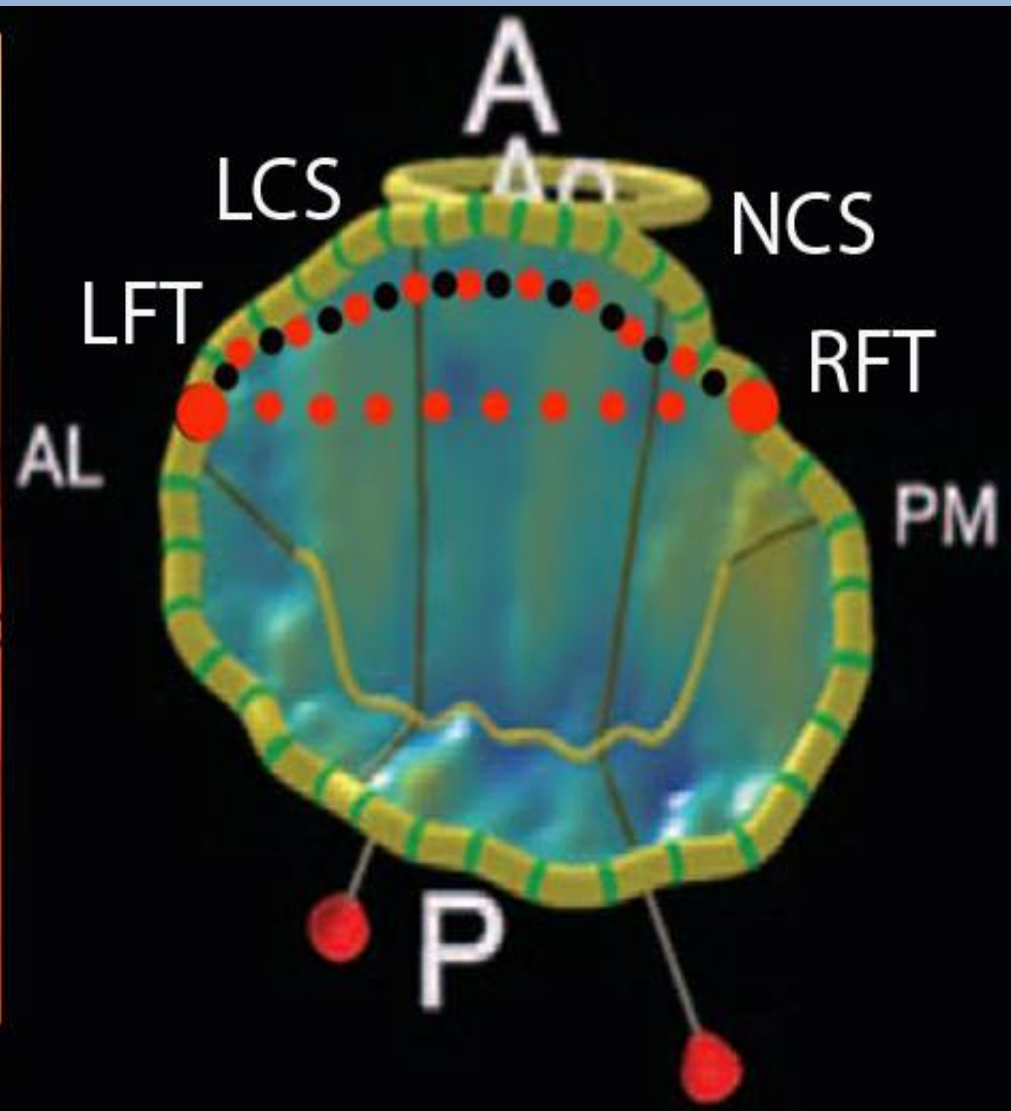




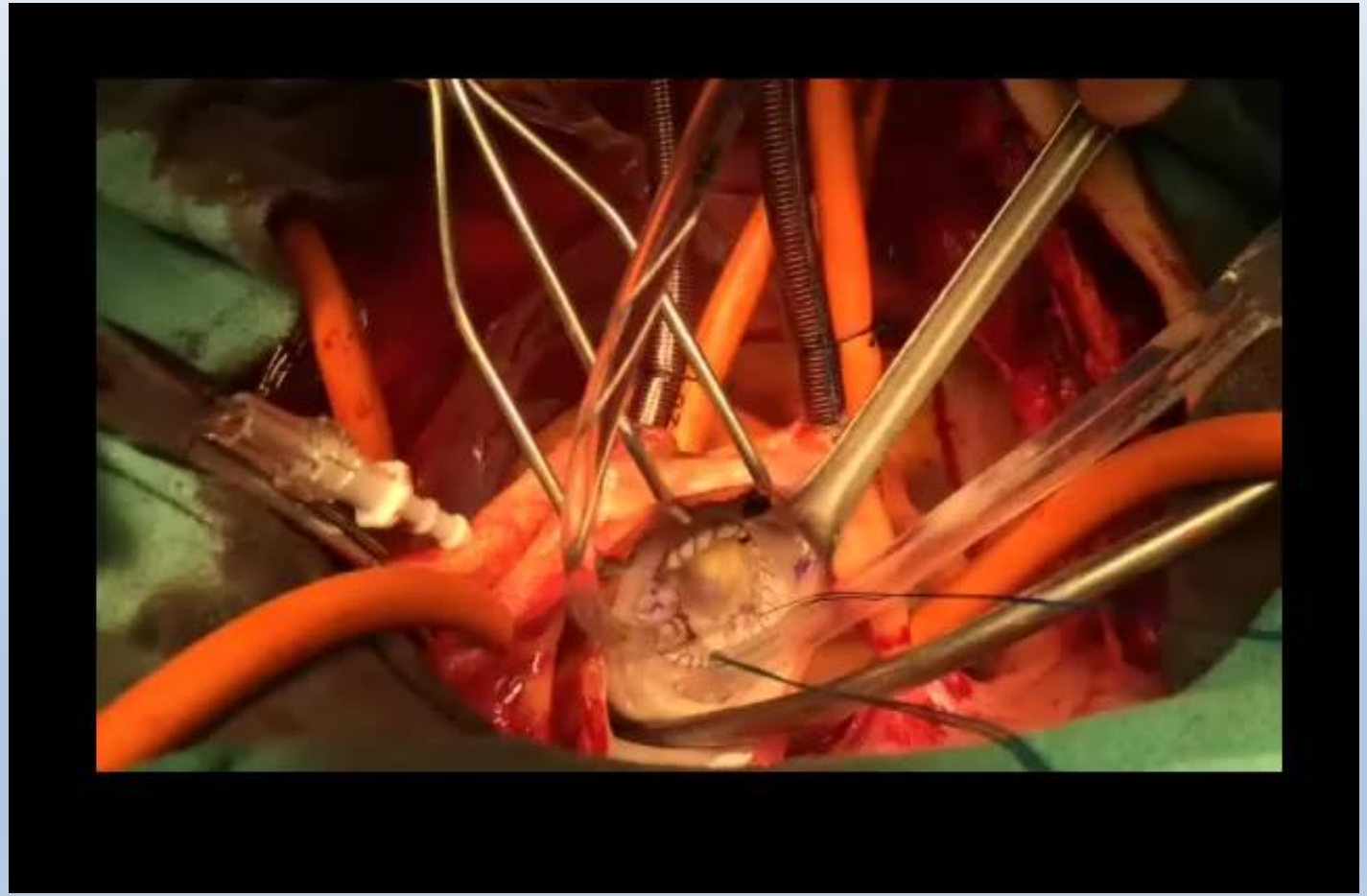
Short-axis **(A)** and long-axis **(B)** images demonstrating the D-shaped mitral annulus comprising the posterior horn **(red contour)** and trigon to-trigone (TT) distance **(white line)**, the latter virtually connecting both fibrous trigones **(purple and green dots)**. The intercommissural (distance **(dotted yellow line)** runs parallel to the TT distance and transects the centroid, and the septal-to-lateral (SL) distance runs perpendicular to the TT distance and transects the centroid. LA = left atrium; LV = left ventricle.

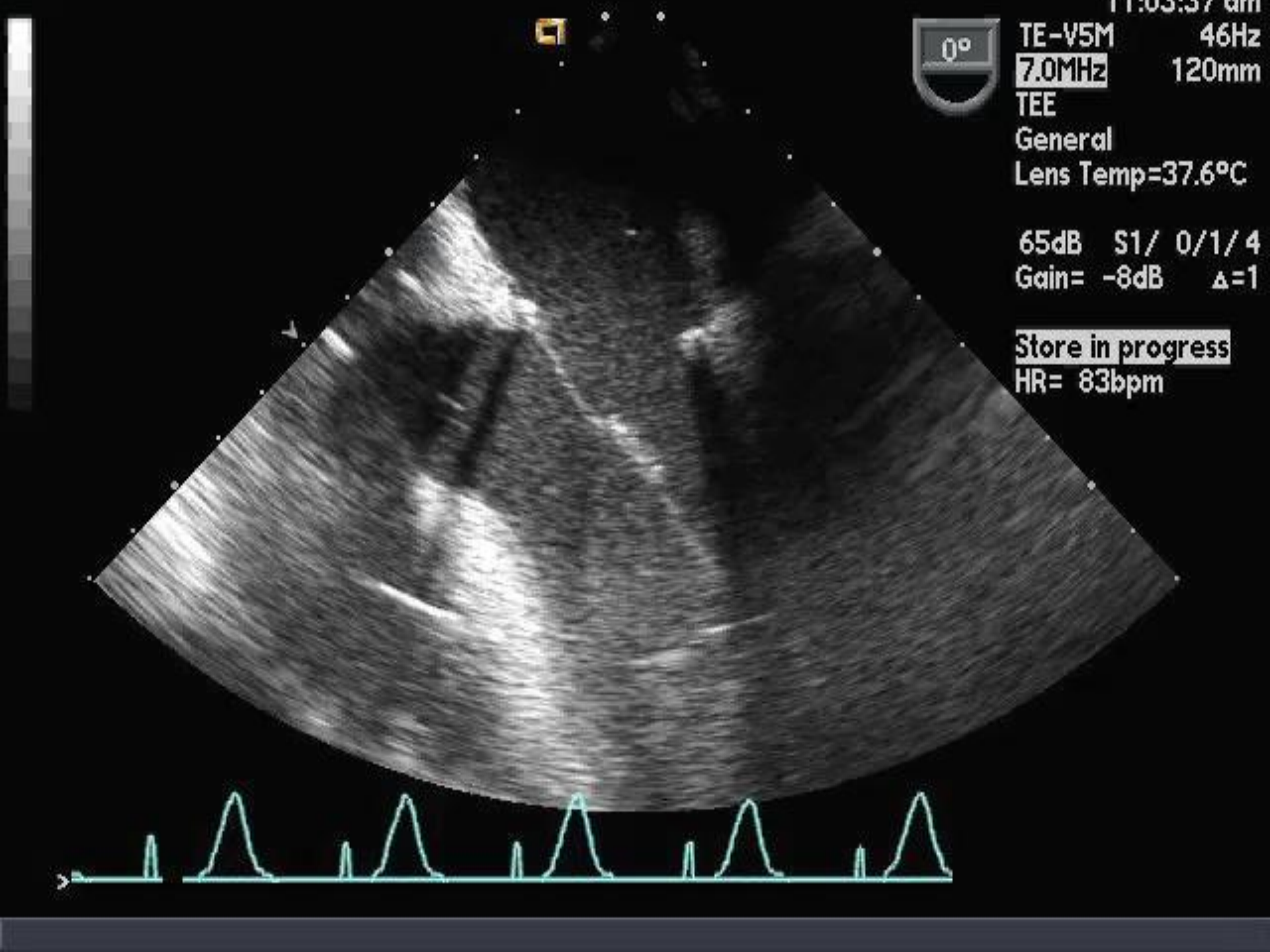
Implanted flexible ring(L). Correlation with 3-D annular tracking.Red dots =Carpentier ring attachment across LVOT



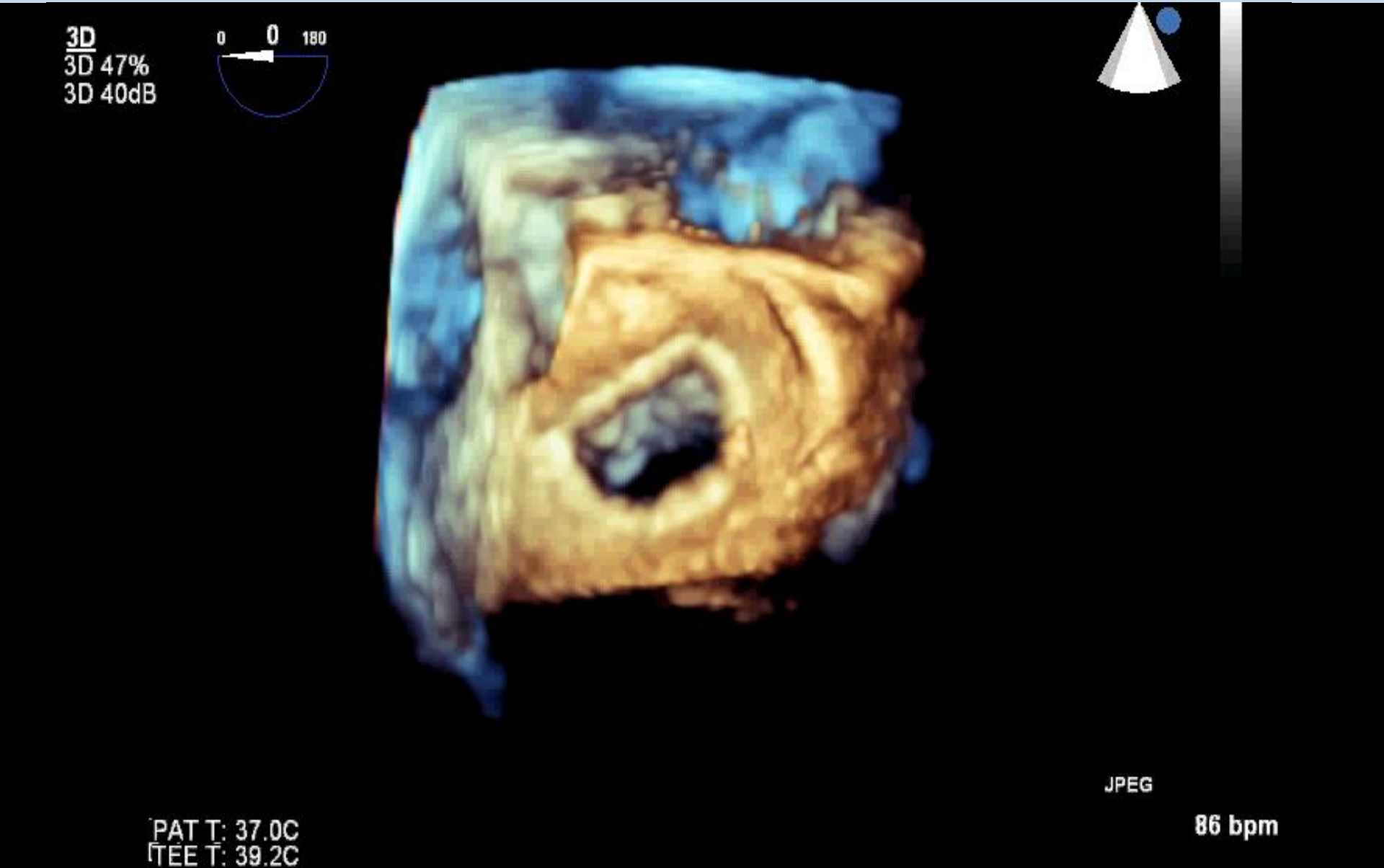


Post-Repair Simulation of Aorto-mitral Dynamics

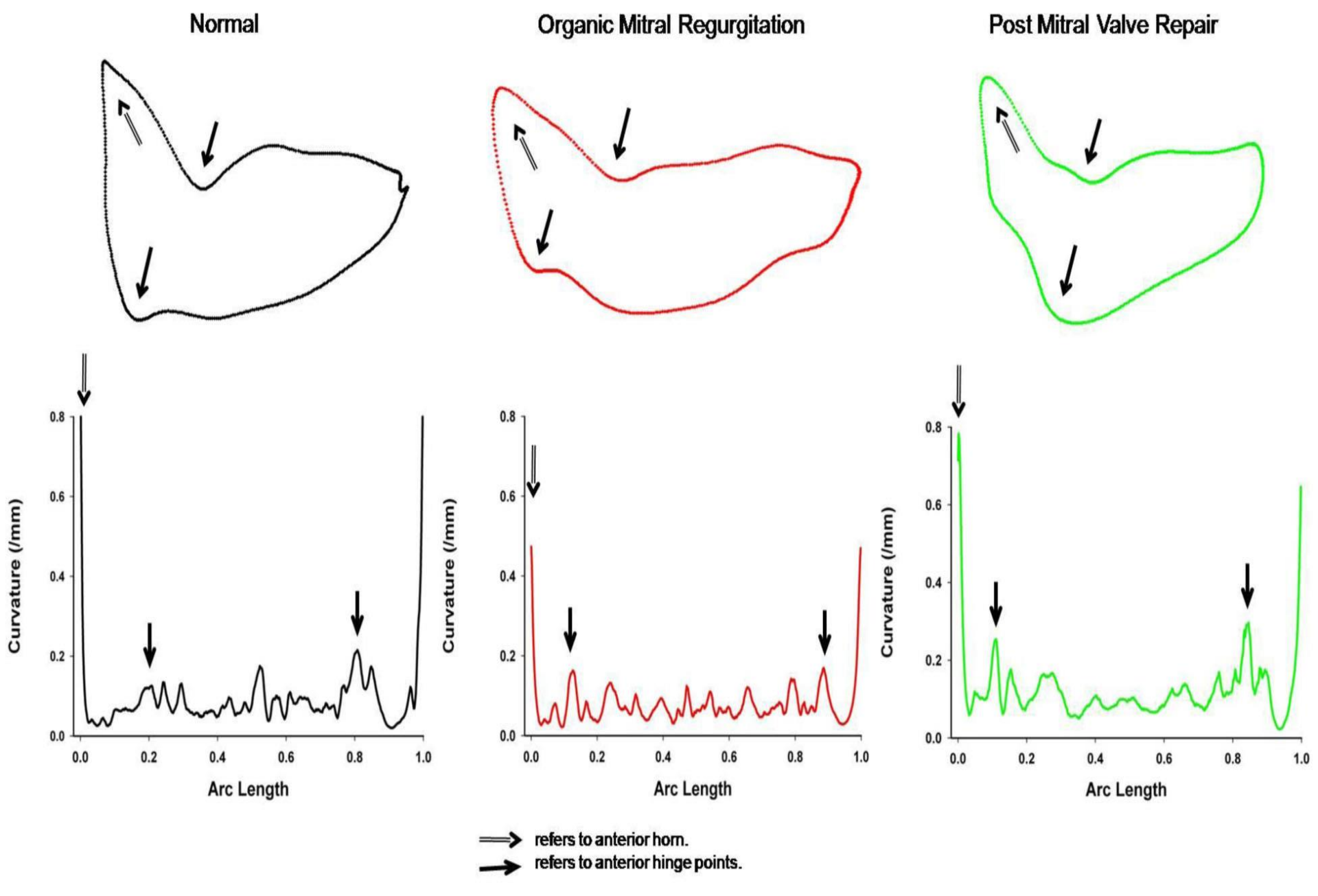



0°
TE-V5M
46Hz
7.0MHz
120mm
TEE
General
Lens Temp=37.6°C
65dB S1/ 0/1/4
Gain= -8dB Δ=1
Store in progress
HR= 83bpm

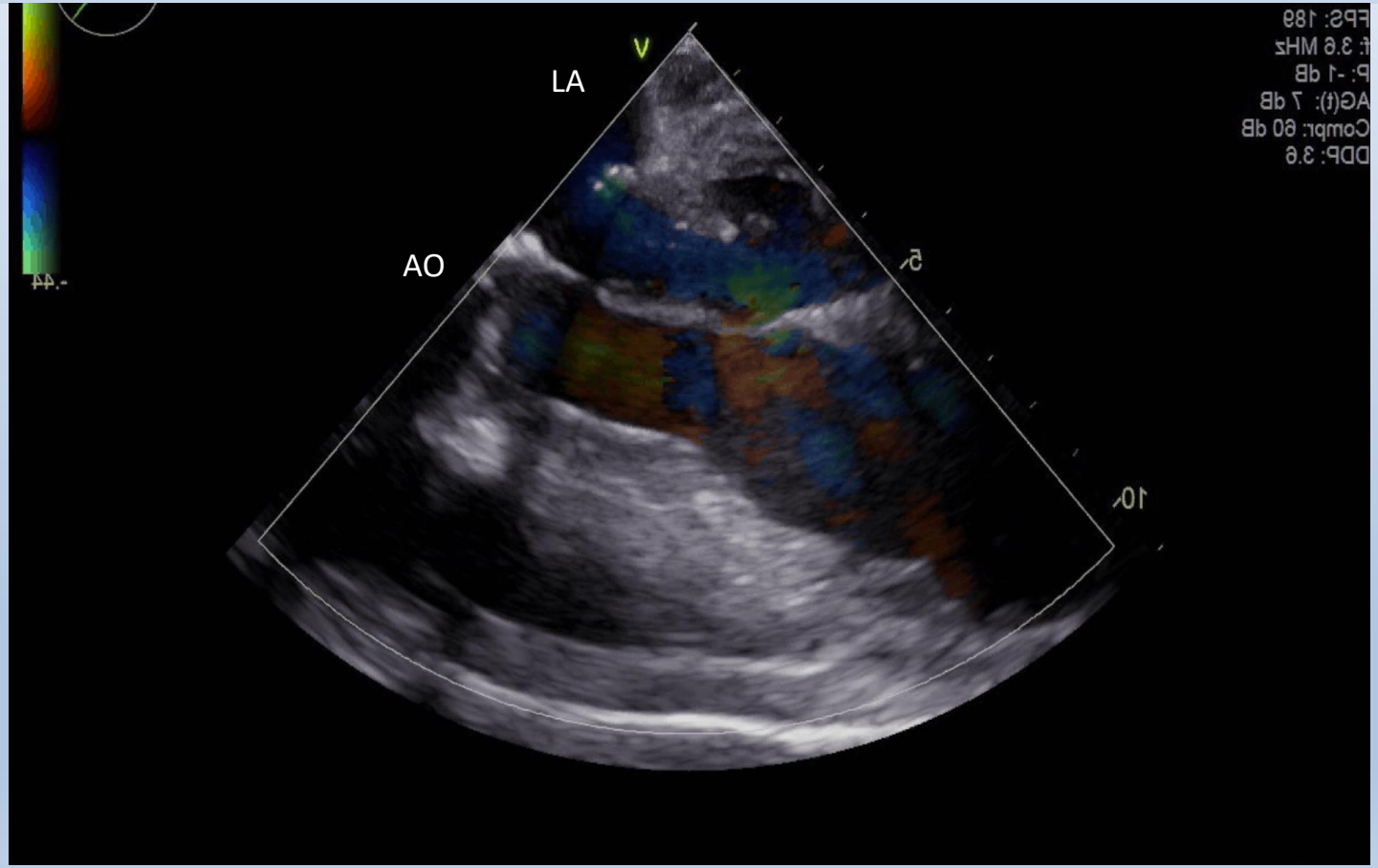
Aortic Mitral Coupling Dynamics after Dynamic Mitral Repair



Mitral Annulus Model and Curvature Analysis



TEE after American Correction- Normal Physiological Function: clockwise vortex at mid-LV moving anterior leaflet towards posterior leaflet



Personal Experience: Mitral Valve Surgeries 1983-2023

All Mitral surgeries	**3137**
Mitral valve repairs	2442
Mitral valve replacements	533
Mitral valve commissurotomy	162

One Hundred Percent Reparability of Mitral Prolapse: Results of a Dynamic Nonresectional Technique

Gerald Lawrie, MD, William Zoghbi, MD, Stephen Little, MD, Dipan Shah, MD, Nan Earle, MS, and Elizabeth Earle, JD

Department of Cardiovascular Surgery, Methodist DeBakey Heart Center, Houston Methodist Hospital, Houston, Texas, and Department of Cardiology, Methodist DeBakey Heart Center, Houston Methodist Hospital, Houston, Texas

ABSTRACT

BACKGROUND We studied the results of a dynamic mitral repair technique that preserves normal mitral valve function by avoiding leaflet resection and rigid and semirigid annuloplasty rings.

METHODS In previous reports we demonstrated that intraoperative simulation of mitral valve locking and isovolumic systole by rapid left ventricular inflation with pressurized saline accurately simulates mitral annular and leaflet shape and position, and left ventricular outflow tract dimensions. Length of polytetrafluoroethylene neochordae and size of fully flexible adjustable annuloplasty ring can be adjusted in three dimensions for accurate apposition of zones of leaflet coaptation, premarked with dots. We followed 1068 consecutive patients after repairs performed between 2001 and 2018.

RESULTS Of the 1068 patients, 674 were men (63.1%). Mean age was 62.25 ± 13 years. Leaflet repaired was anterior in 118 patients (11.05%), posterior in 564 (52.81%), both in 55 (5.15%), and neither in 123 (11.5%). Barlow's disease was present in 208 patients (19.48%). Repair was isolated in 82.5% (881 of 1068). Reparability was 100%. Perioperative mortality overall was 1.59% (17 of 1068): isolated repair, 1.14% (10 of 881); and isolated posterior leaflet, 0.85% (4 of 472). Leaflet systolic anterior motion occurred in 1.7% (18 of 1068), and was significant in 0.4% (4 of 1068). Survival at 10 years by Kaplan-Meier analysis was 74.65%, freedom from reoperation was 96.01%, and freedom from severe mitral regurgitation was 94%. The only predictor of reoperation (Cox analysis) was being male ($P = .001$).

CONCLUSIONS Use of intraoperative simulation of mitral dynamics led to 100% reparability for degenerative valves with minimal systolic anterior motion, despite no leaflet resection. Long-term durability has been good and similar for all leaflets.

(Ann Thorac Surg 2021;112:1921-8)

15 Year Results of Dynamic Mitral Repair.

Repair rate 100% for 20 years, mitral gradient 2.2mmHg, significant transient SAM 0.4%

Lawrie et al Ann Thorac Surg, 2021;112:1921-1928

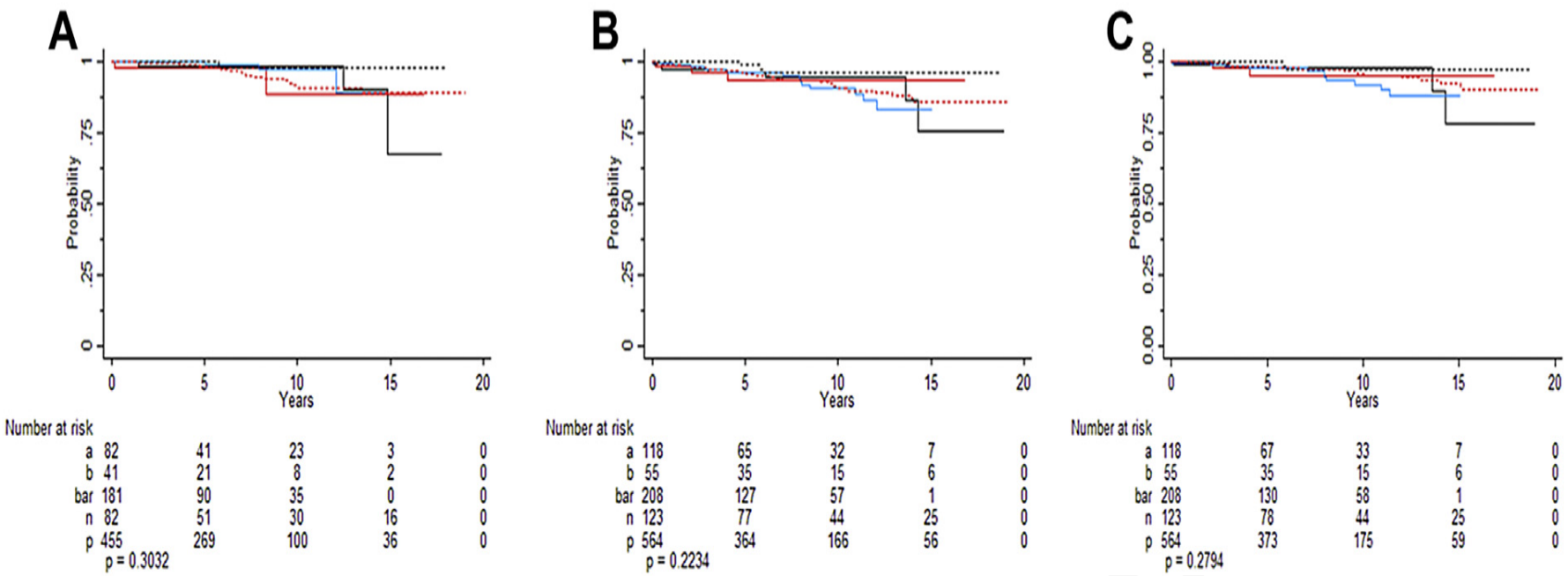
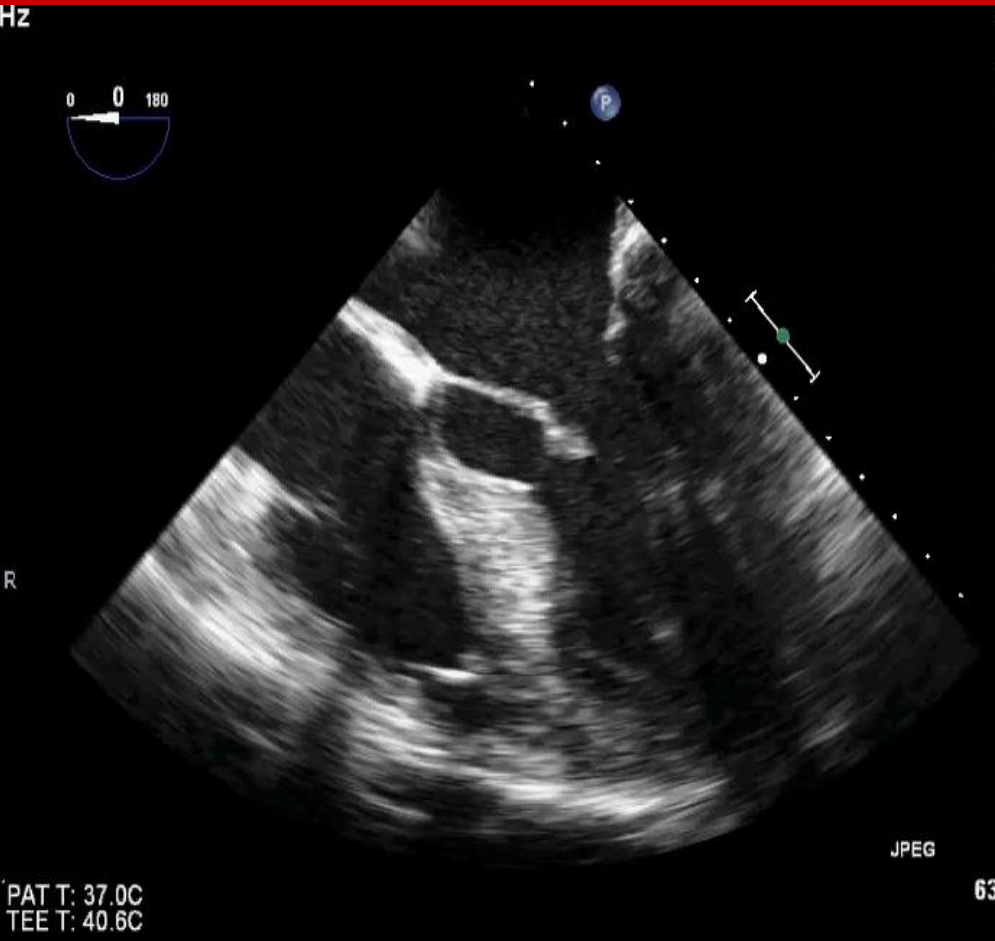
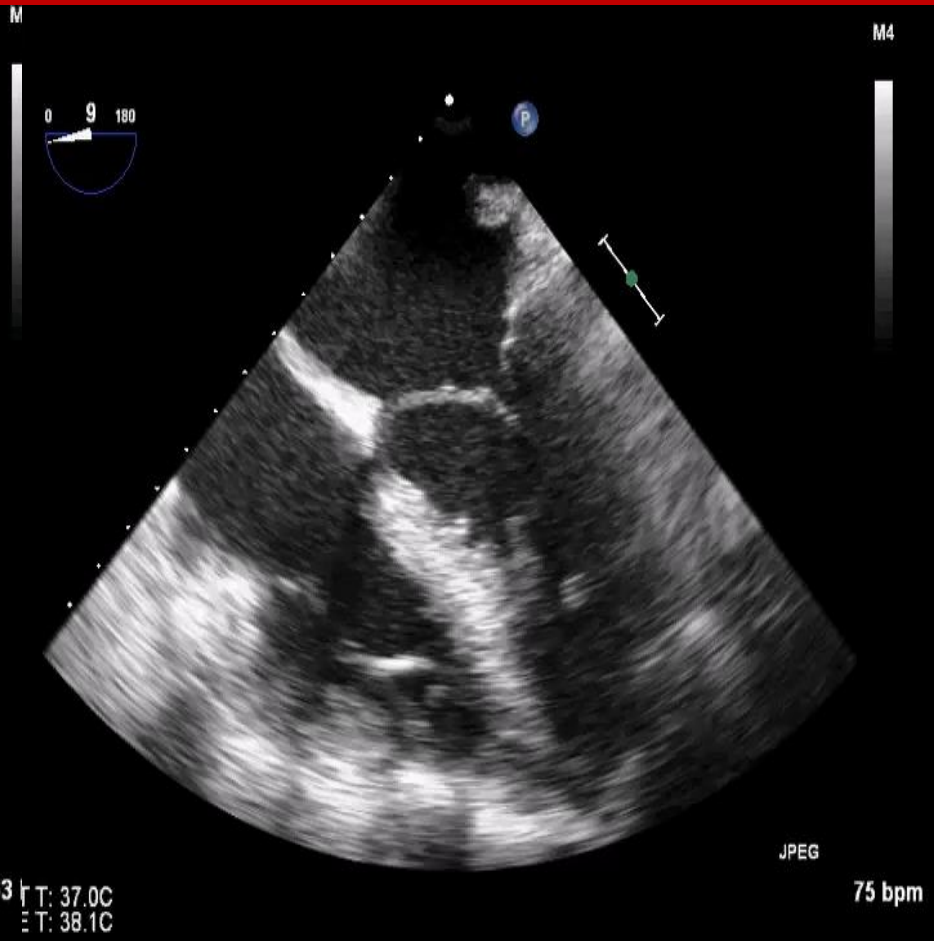


FIGURE 2 (A) Kaplan-Meier analysis of freedom from significant mitral regurgitation by leaflet repaired. (B) Kaplan-Meier analysis of freedom from reoperation by leaflet repaired. (C) Kaplan-Meier analysis of freedom from prosthesis by leaflet repaired. Solid black line indicates anterior leaflet repaired; solid red line, both leaflets; solid blue line, Barlow's pattern; broken black line, neither; and broken red line, posterior.

Severe SAM,MR, from HOCM





Hypertrophic Cardiomyopathy Association

Serving the HCM Spectrum Disorder Community Since 1996

Conclusion

- Mitral valve repair -optimal treatment for primary MR.

-**Only a small minority of elite surgeons** have mastered the ”Art of repair”using Carpentier based techniques.

-**American Correction techniques (Science not art)**

-preserve and restore normal mitral physiology

-easier to learn (have a single main component for all patterns)

-produce high repair rates.

-Choice of surgeon is an important part of the care of these patients.

Not Covered here

Ischemic MR

MAC

Videos of surgical procedures A

Go to U Tube: Gerald Lawrie MD ,mitral valve repair to see one hour lectures given at Grand Rounds on the first two topics and surgical videos.