La diagnosi e l'indicazione chirurgica del malfunzionamento delle protesi biologiche. Il Follow-up. Il Reintervento.

Francesco Santini

Division of Cardiac Surgery, IRCCS San Martino – IST
University of Genova Medical School, Italy

Heart Valve Bioprostheses

Prosthetic valve malfunction

Diagnosis and f-up of bioprosthetic valve malfunction

Indication for reoperation

Risk assessment, special issue & results

Alternative emerging strategies

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Porcine *Stented* Bioprostheses

Intact

Hancock

Biocor

Labcor

Mosaic

Epic

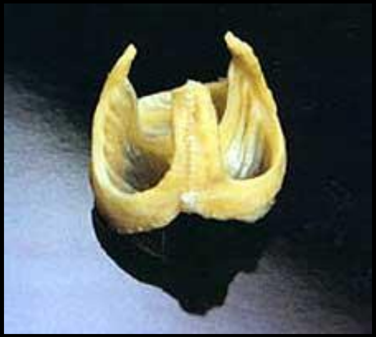
Tissuemed

Carpentier-Edwards
S.A.V.

Porcine *Stentless* Bioprostheses

O'Brien

Cryolife



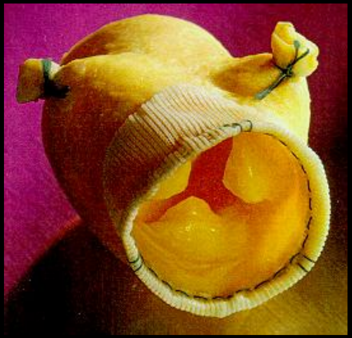
Labcor

Prima

Toronto

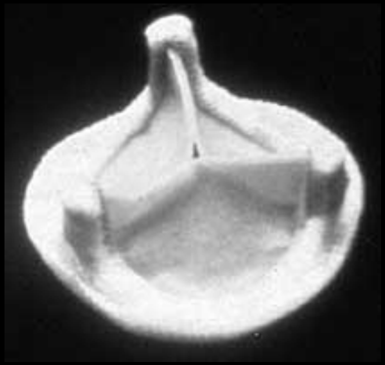
Semi-stented Shelhigh

Condotto valvolare Shelhigh

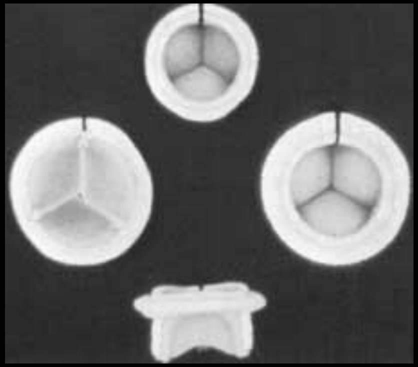


Freestyle

Pericardial *Stented* Bioprostheses



Carpentier-Edwards pericardial



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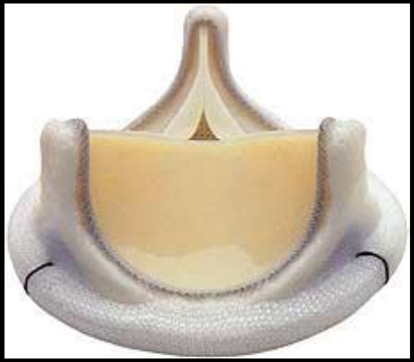
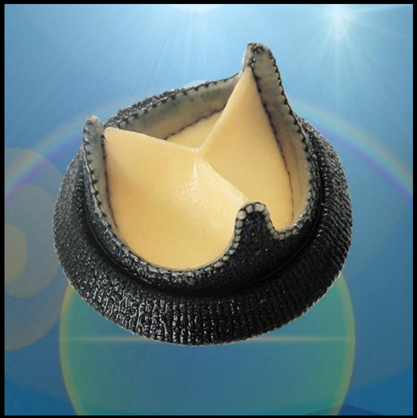


Perimount

Mitroflow



Pericarbon Møre

Soprano

Pericardial *Stentless* Bioprostheses

St. Jude Quattro

Pericarbon Freedom

Freedom Solo

Sutureless Ao bioprostheses

Percutaneous Ao bioprosthesis

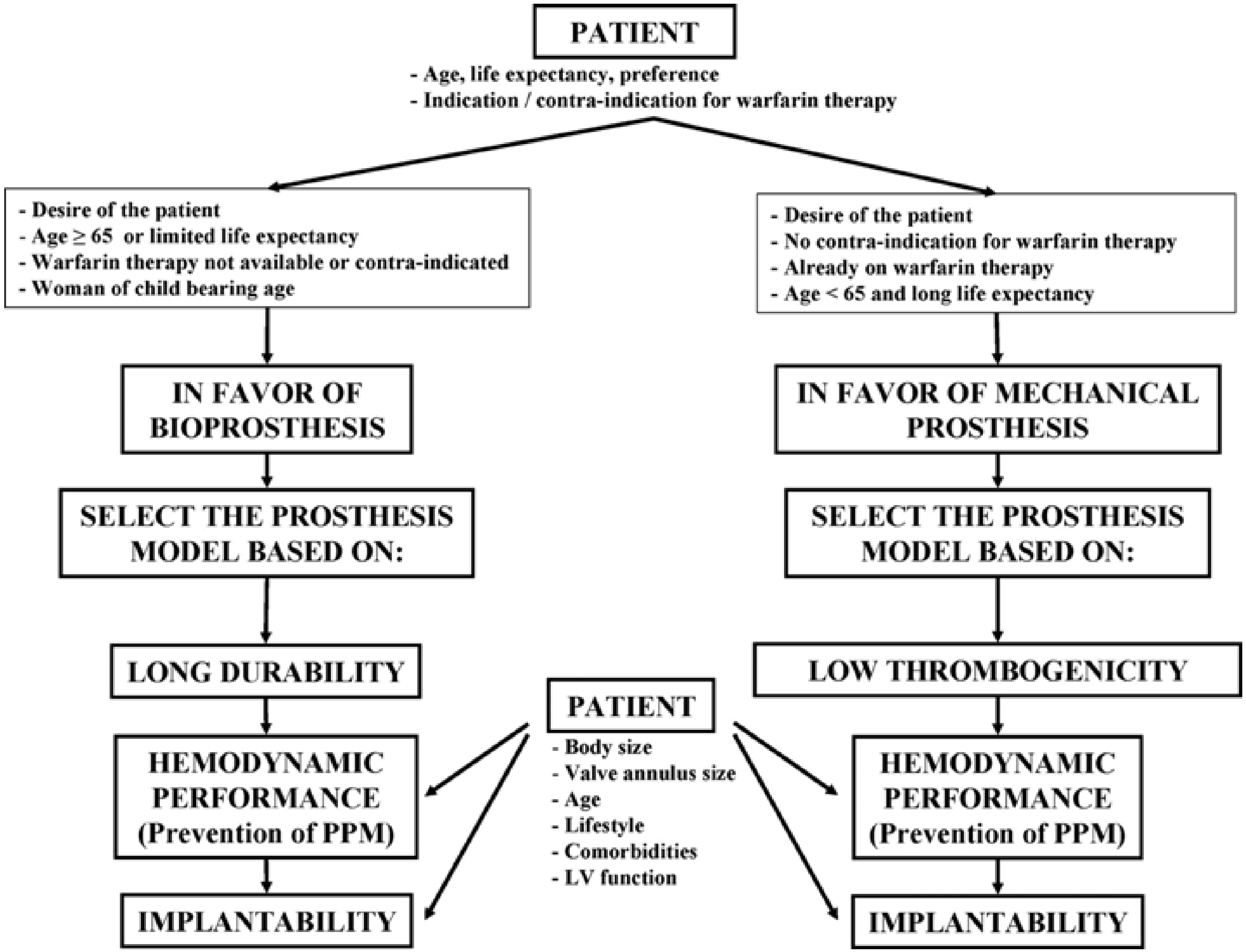
Perceval S
(bovine pericardium)

over a balloon
(Edwards Sapien)

Intuity
(bovine pericardium)

self-expandable
(CoreValve)

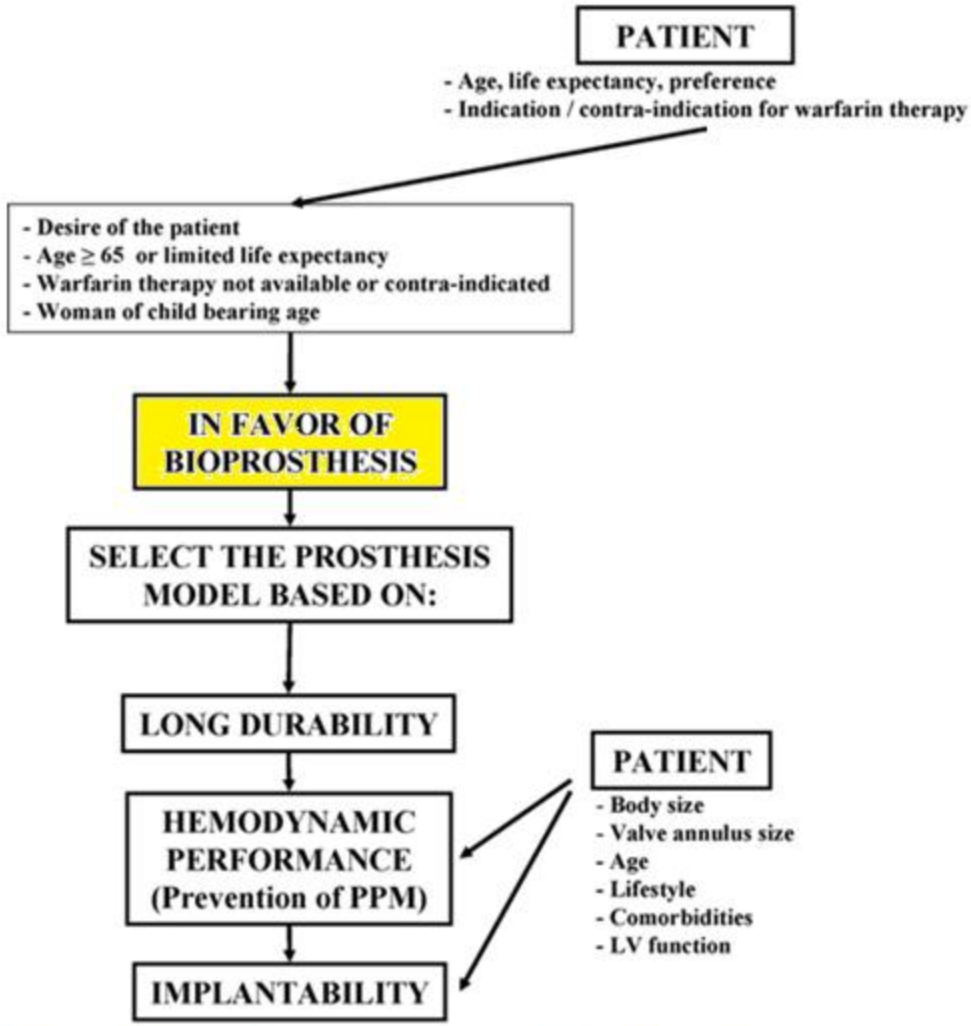
Algorithm for the selection of the optimal prosthesis in the individual patient



Pibarot P, Dumesnil J. Circulation 2009;119:1034-1048

American Heart Association

Algorithm for the selection of the optimal prosthesis in the individual patient

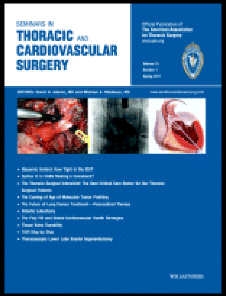


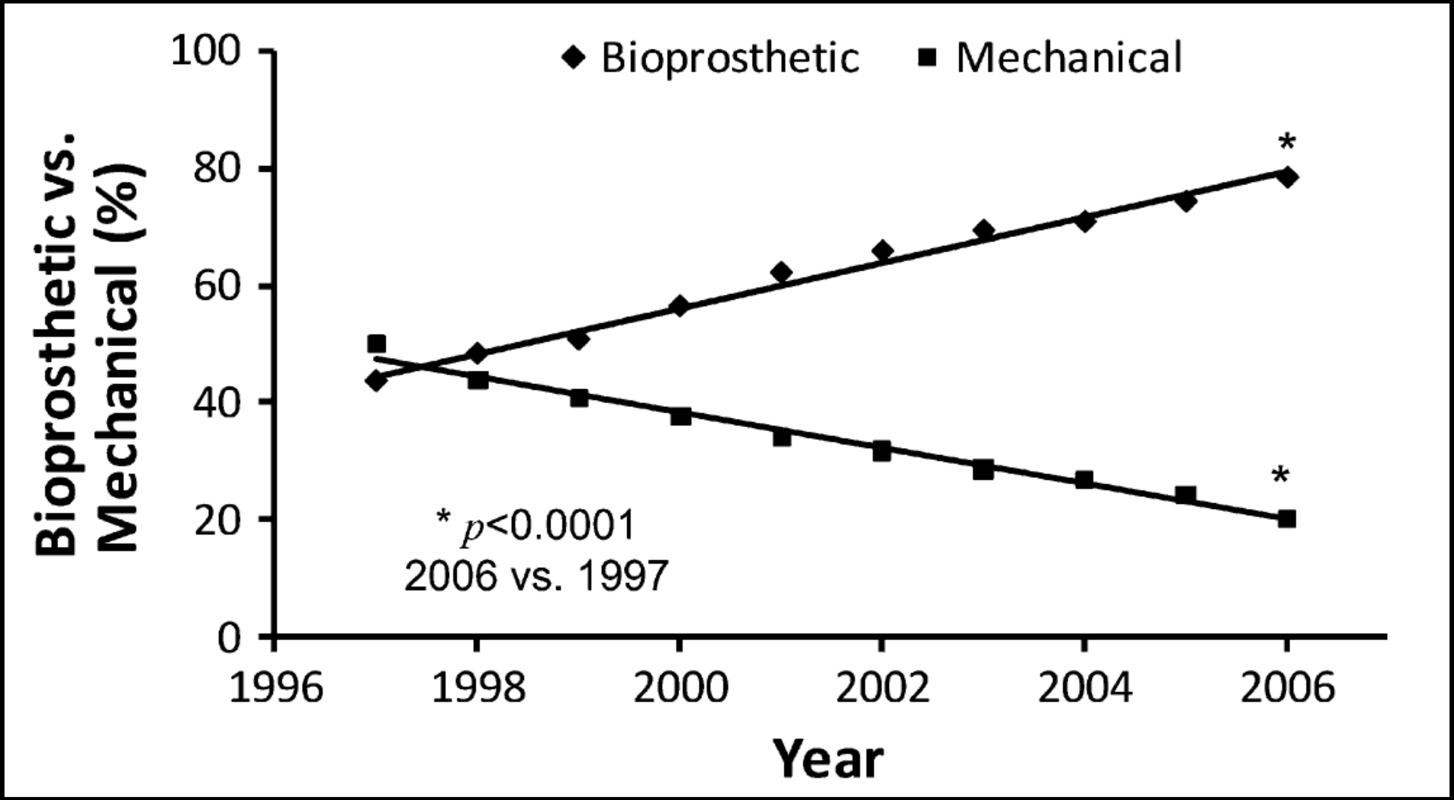
Pibarot P, Dumesnil J. Circulation 2009;119:1034-1048

American Heart Association.

Isolated aortic valve replacement in North America comprising 108,687 patients in 10 years: Changes in risks, valve types, and outcomes in the Society of Thoracic Surgeons National Database

James M. Brown, MD,[a] Sean M. O'Brien, PhD,[b] Changfu Wu, PhD,[a] Jo Ann H. Sikora, CRNP,[a] Bartley P. Griffith, MD,[a] and James S. Gammie, MD[a]



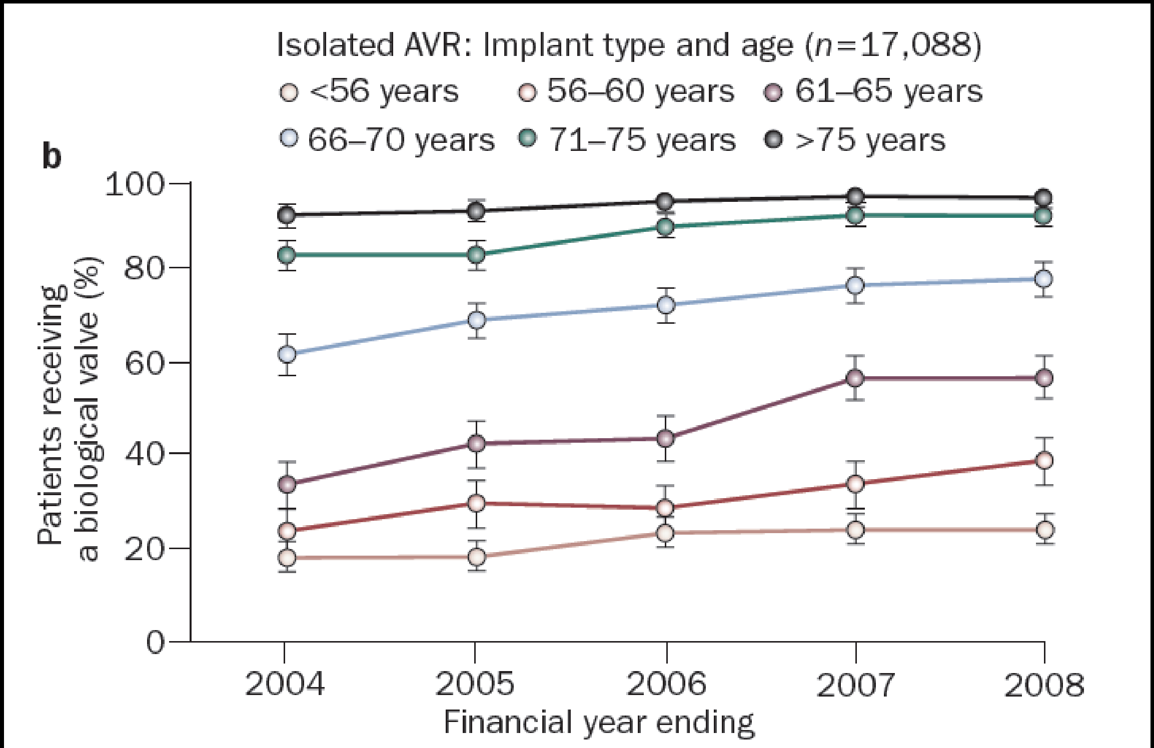


Percentage use of bioprosthetic valves relative to mechanical valves from 1997 through 2006

J Thorac Cardiovasc Surg 2009;137:82-90

Prosthetic valve selection for middle-aged patients with aortic stenosis

Joanna Chikwe, Farzan Filsoufi and Alain F. Carpentier



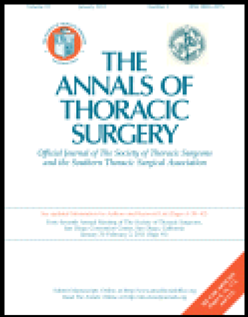
Increase in percentage of bioprosthetic valves implanted for aortic valve replacement according to patient age.

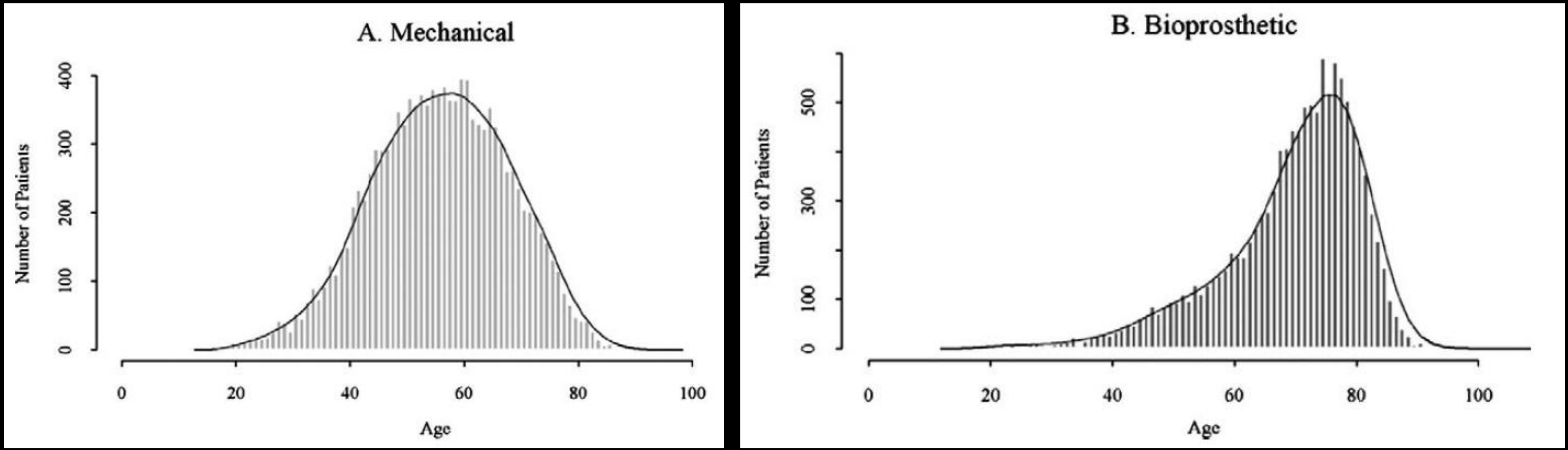
Nat. Rev. Cardiol. 7, 711–719 (2010)

Trends in Mitral Valve Surgery in the United States: Results From The Society of Thoracic Surgeons Adult Cardiac Database

James S. Gammie, MD, Shubin Sheng, PhD, Bartley P. Griffith, MD, Eric D. Peterson, MD, J. Scott Rankin, MD, Sean M. O'Brien, PhD, and James M. Brown, MD

Division of Cardiac Surgery, University of Maryland Medical Center, Baltimore, Maryland; Duke Clinical Research Institute, Durham, North Carolina; and Centennial Medical Center, Vanderbilt University, Nashville, Tennesse





Cumulative age distribution of patients receiving mechanical and bioprosthetic replacement valves.

Ann Thorac Surg 2009;87:1431–9

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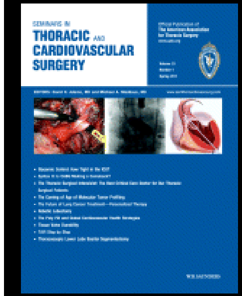
Prosthetic valve malfunction:

Any abnormality *intrinsic or not intrinsic* to the prosthetic valve itself that results in stenosis or regurgitation of the operated valve, or hemolysis.

J Thorac Cardiovasc Surg 2008;135:732-8

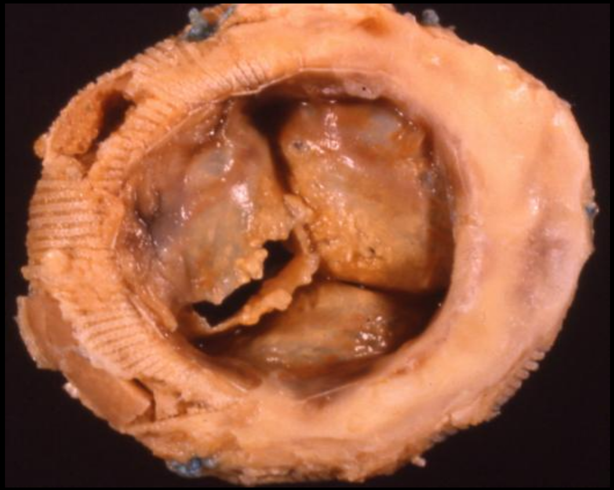
Guidelines for reporting mortality and morbidity after cardiac valve interventions

Cary W. Akins, MD,[a] D. Craig Miller, MD,[a] Marko I. Turina, MD,[c] Nicholas T. Kouchoukos, MD,[b] Eugene H. Blackstone, MD,[a] Gary L. Grunkemeier, PhD,[b] Johanna J. M. Takkenberg, MD, PhD,[c] Tirone E. David, MD,[a] Eric G. Butchart, MD,[c] David H. Adams, MD,[b] David M. Shahian, MD,[b] Siegfried Hagl, MD,[c] John E. Mayer, MD,[b] and Bruce W. Lytle, MD[a]

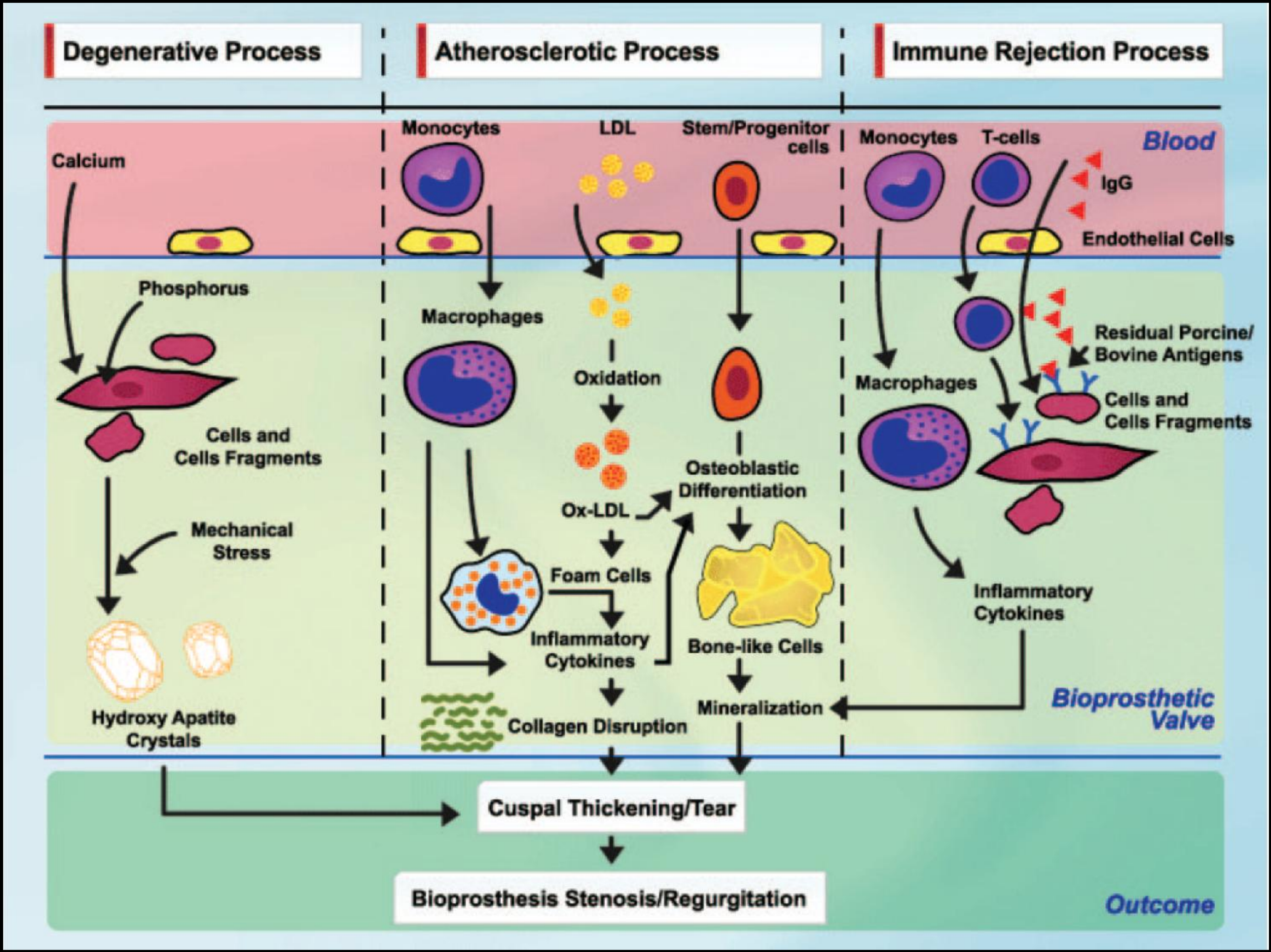


Structural Valve Deterioration

The term refers to changes intrinsic to the valve, such as wear, fracture, calcification, leaflet tear, stent creep, and suture line disruption of components of a prosthetic valve.
Clinical investigation should include periodic echocardiographic surveillance.
The increased regurgitation or stenosis of the operated valve over time should be reported with quantitative or semiquantitative methods.



J Thorac Cardiovasc Surg 2008;135:732-8



Circulation. 2009;119:1034-1048

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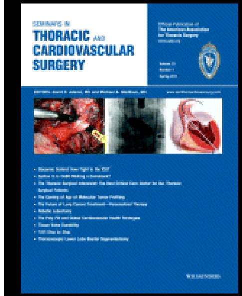
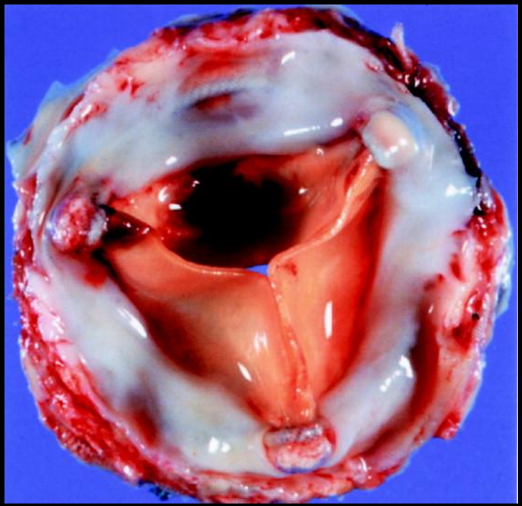
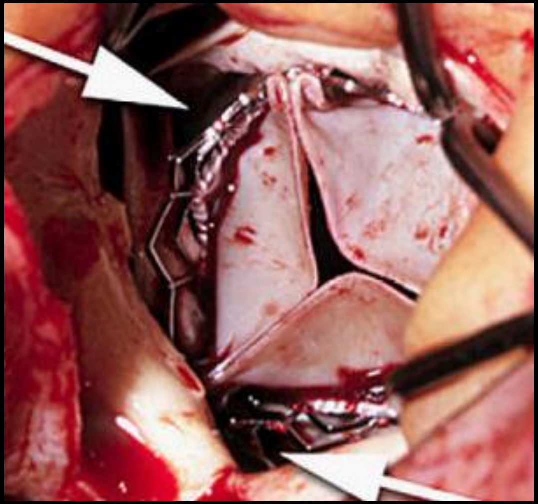


Nonstructural Dysfunction (I)

It is any abnormality not intrinsic to the valve itself that results in stenosis or regurgitation of the operated valve. Hemolysis.

It may include: entrapment by pannus, tissue, or suture; paravalvular leak; inappropriate sizing or positioning; residual leak or obstruction after valve implantation (or repair). Clinically important intravascular hemolytic anemia. The increased regurgitation or stenosis ……





J Thorac Cardiovasc Surg 2008;135:732-8

Valve Prosthesis–Patient Mismatch, 1978 to 2011

From Original Concept to Compelling Evidence*

Philippe Pibarot, DVM, PhD,
Jean G. Dumesnil, MD
Québec, Québec, Canada

First proposed in 1978 by Rahimtoola.

When the EOA of a normally functioning prosthesis is too small in relation to the patient's body size (and therefore cardiac output requirements), resulting in abnormally high postoperative gradients.

Indexed EOA (EOA of the prosthesis divided by the patient's body surface area)

Moderate PPM may be quite frequent in both the aortic (20% to 70%) and mitral (30% to 70%) positions, whereas the prevalence of severe PPM ranges from 2% to 10% in both positions.

Table 3. Threshold Values of Indexed Prosthetic Valve EOA for the Identification and Quantification of PPM

	Mild or Not Clinically Significant, cm^2/m^2	Moderate, cm^2/m^2	Severe, cm^2/m^2
Aortic position	>0.85 (0.8–0.9)	≤0.85 (0.8–0.9)	≤0.65 (0.6–0.7)
Mitral position	>1.2 (1.2–1.3)	≤1.2 (1.2–1.3)	≤0.9 (0.9)

Numbers in parentheses represent the range of threshold values that have been used in the literature.

JACC 2012;13:1136-9

Guidelines for reporting mortality and morbidity after cardiac valve interventions

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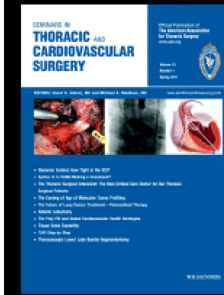

Valve Thrombosis

Any thrombus not caused by infection attached to or near an operated valve that occludes part of the blood flow path, interferes with valve function, or is sufficiently large to warrant treatment.

Operated Valve Endocarditis

Any infection involving a valve on which an operation has been performed.

J Thorac Cardiovasc Surg 2008;135:732-8

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2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

Rick A. Nishimura, Catherine M. Otto, Robert O. Bonow, Blase A. Carabello, John P. Erwin III, Robert A. Guyton, Patrick T. O'Gara, Carlos E. Ruiz, Nikolaos J. Skubas, Paul Sorajja, Thoralf M. Sundt III and James D. Thomas

http://circ.ahajournals.org

Patients who have undergone valve replacement are not cured but still have serious heart disease.

They have exchanged native valve disease for prosthetic valve disease…

and must be followed with the same care as those with native valve disease.

American Heart Association®

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

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American Heart Association®

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Class I

1. An initial TTE study is recommended in patients after prosthetic valve implantation for evaluation of valve hemodynamics . *(Level of Evidence: B)*

2. Repeat TTE is recommended in patients with prosthetic heart valves if there is a change in clinical symptoms or signs suggesting valve dysfunction. *(Level of Evidence: C)*

3. TEE is recommended when clinical symptoms or signs suggest prosthetic valve dysfunction. *(Level of Evidence: C)*

Class IIa

1. Annual TTE is reasonable in patients with a bioprosthetic valve after the first 10 years, even inthe absence of a change in clinical status. (*Level of Evidence: C)*

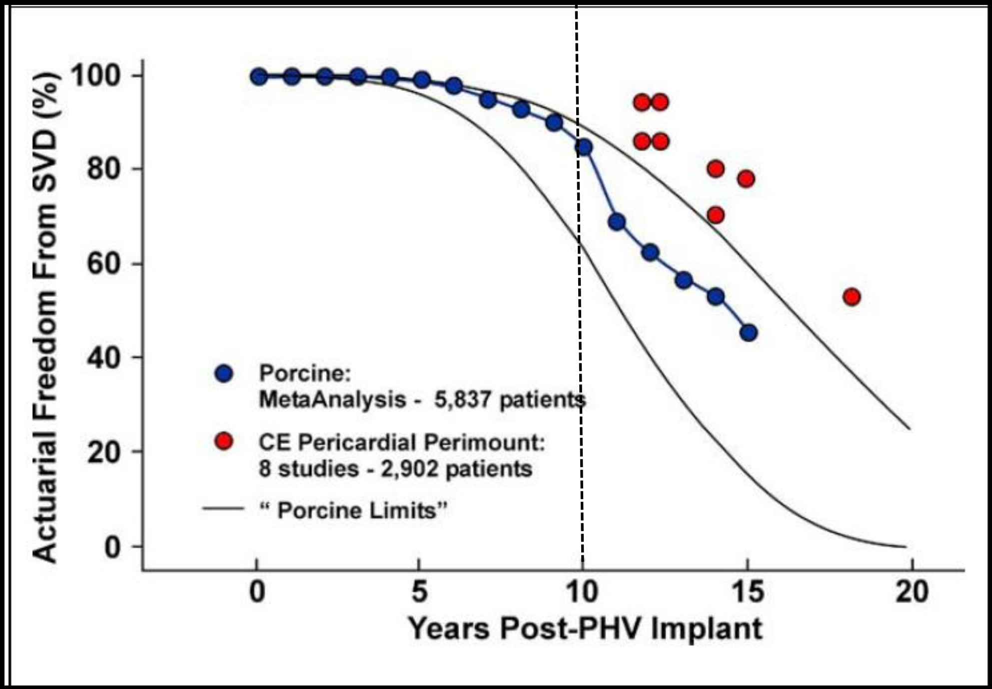
Earlier evaluation may also be prudent in selected patients at increased risk of early bioprosthetic valve degeneration, including those with *renal impairment*, *diabetes mellitus*, *abnormal calcium metabolism*, *systemic inflammatory disease*, and in patients *<60 years of age*.

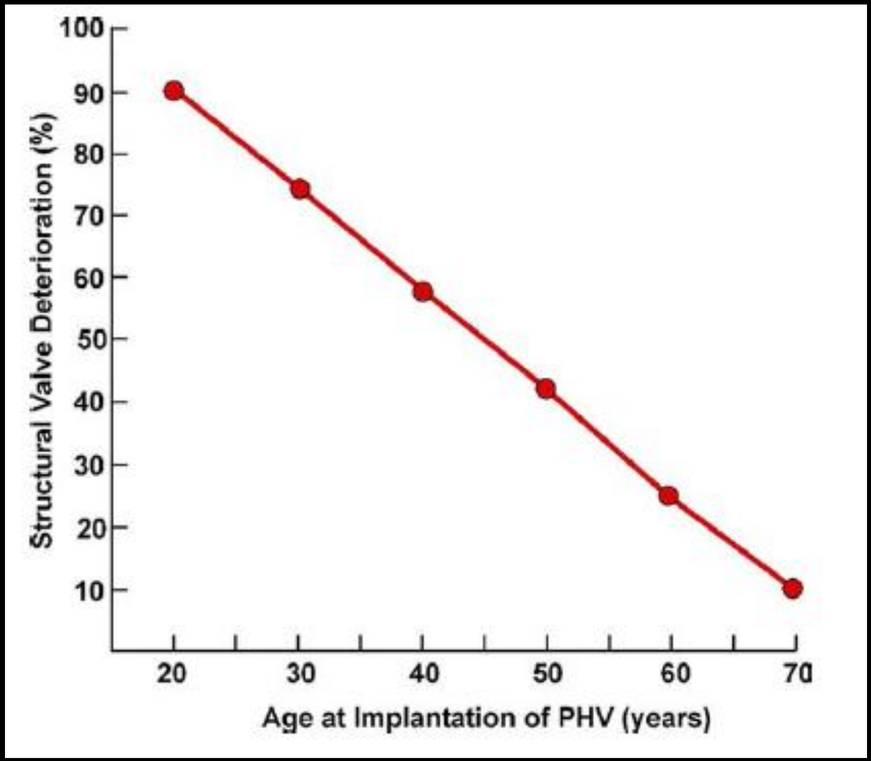
STATE-OF-THE-ART PAPER

Choice of Prosthetic Heart Valve in Adults

An Update

Shahbudin H. Rahimtoola, MB, FRCP, DSc (Hon)





SVD = structural valve deterioration

JACC 2010;22:2413–26

GUIDELINES AND STANDARDS

Recommendations for Evaluation of Prosthetic Valves With Echocardiography and Doppler Ultrasound

A Report From the American Society of Echocardiography's Guidelines and Standards Committee and the Task Force on Prosthetic Valves, Developed in Conjunction With the American College of Cardiology Cardiovascular Imaging Committee, Cardiac Imaging Committee of the American Heart Association, the European Association of Echocardiography, a registered branch of the European Society of Cardiology, the Japanese Society of Echocardiography and the Canadian Society of Echocardiography, Endorsed by the American College of Cardiology Foundation, American Heart Association, European Association of Echocardiography, a registered branch of the European Society of Cardiology, the Japanese Society of Echocardiography, and Canadian Society of Echocardiography

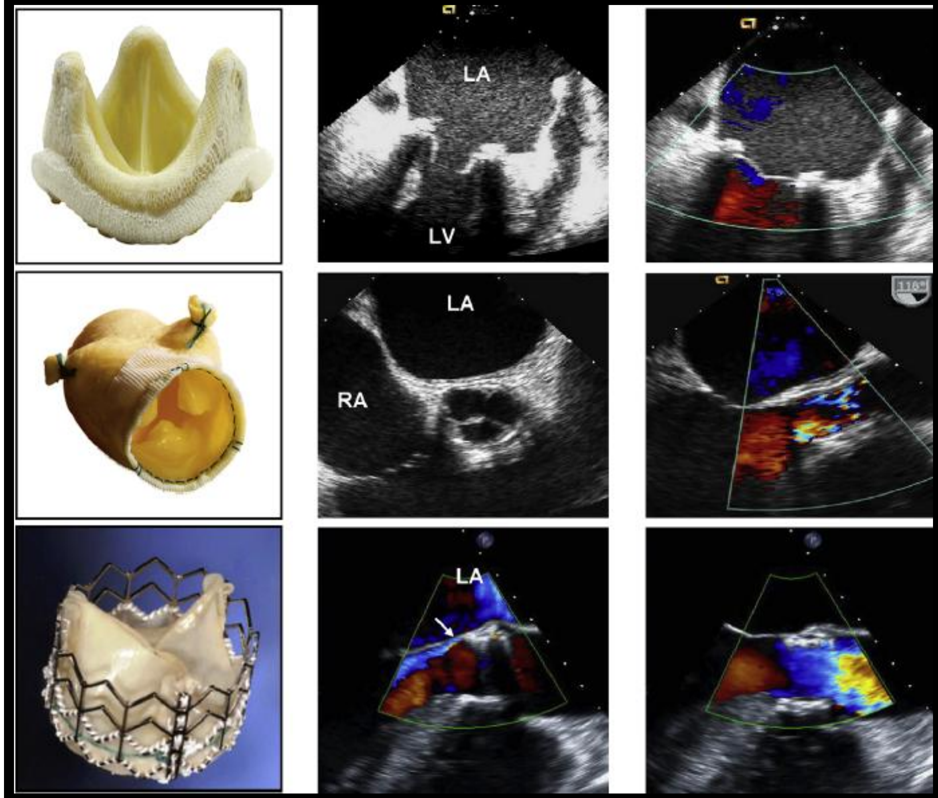
William A. Zoghbi, MD, FASE, Chair, John B. Chambers, MD,* Jean G. Dumesnil, MD,† Elyse Foster, MD,‡ John S. Gottdiener, MD, FASE, Paul A. Grayburn, MD, Bijoy K. Khandheria, MBBS, FASE, Robert A. Levine, MD, Gerald Ross Marx, MD, FASE, Fletcher A. Miller, Jr., MD, FASE, Satoshi Nakatani, MD, PhD,§ Miguel A. Quiñones, MD, Harry Rakowski, MD, FASE, L. Leonardo Rodriguez, MD, Madhav Swaminathan, MD, FASE, Alan D. Waggoner, MHS, RDCS, Neil J. Weissman, MD, FASE,‖ and Miguel Zabalgoitia, MD, *Houston and Dallas, Texas; London, United Kingdom; Quebec City, Quebec, Canada; San Francisco, California; Baltimore, Maryland; Scottsdale, Arizona; Boston, Massachusetts; Rochester, Minnesota; Suita, Japan; Toronto, Ontario, Canada; Cleveland, Ohio; Durham, North Carolina; St Louis, Missouri; Washington, DC; Springfield, Illinois*

Zoghbi et al, Journal of the American Society of Echocardiography : 2009

Essential parameters in the comprehensive evaluation of prosthetic valve function

	Parameter
Clinical information	Date of valve replacement Type and size of the prosthetic valve Height, weight, body surface area Symptoms and related clinical findings Blood pressure and heart rate
Imaging of the valve	Motion of leaflets Presence of calcification on the leaflets or abnormal echo densities on the various components of the prosthesis Valve sewing ring integrity and motion
Doppler echocardiography of the valve	Contour of the jet velocity signal Peak velocity and gradient Mean pressure gradient VTI of the jet DVI Pressure half-time in MV and TV. EOA* Presence, location, and severity of regurgitation†
Other echocardiographic data	LV and RV size, function, and hypertrophy LA and right atrial size Concomitant valvular disease Estimation of pulmonary artery pressure
Previous postoperative studies, when available	Comparison of above parameters is particularly helpful in suspected prosthetic valvular dysfunction

Imaging of the Bioprosthesis



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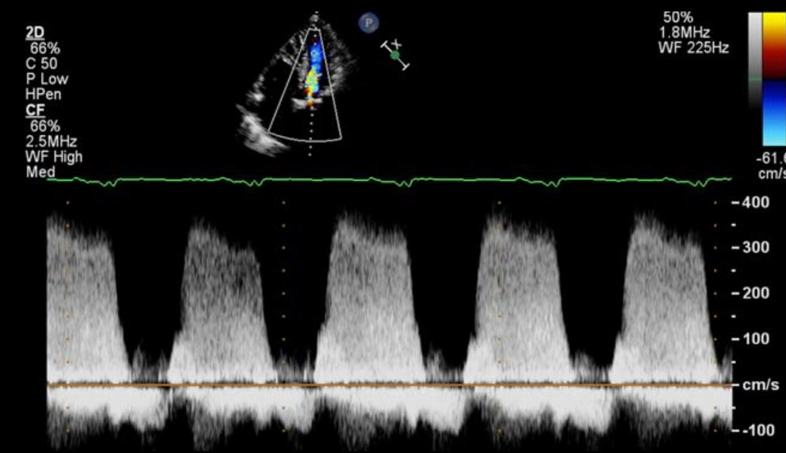

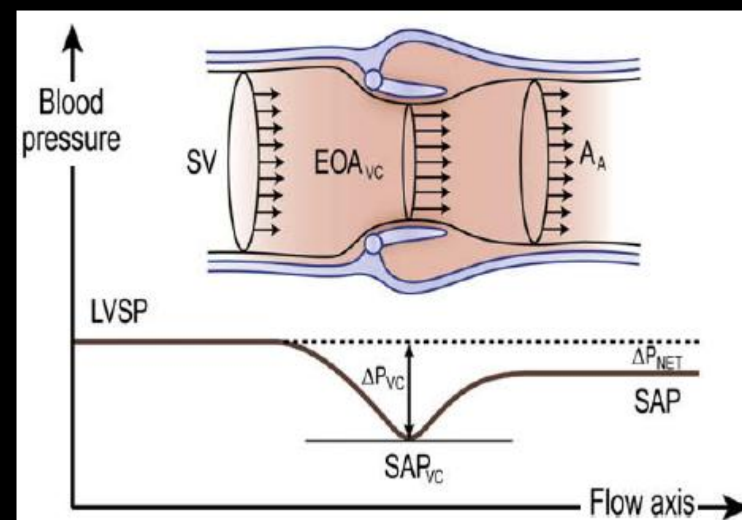

$$EOA = \text{stroke volume}/VTI_{PrV,}$$

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Prosthetic Valve Stenosis

(fibrosis, calcification, thrombosis, PPM)

Class I

1. Repeat valve replacement is indicated for severe symptomatic prosthetic valve stenosis. *(Level of Evidence: C)*

Prosthetic Valve Regurgitation

(leaflet degeneration and calcification, tear or perforation, paravalvular leak)

Class IIa

1. Surgery is reasonable for operable patients with severe symptomatic or asymptomatic (*) bioprosthetic regurgitation. *(Level of Evidence C)*

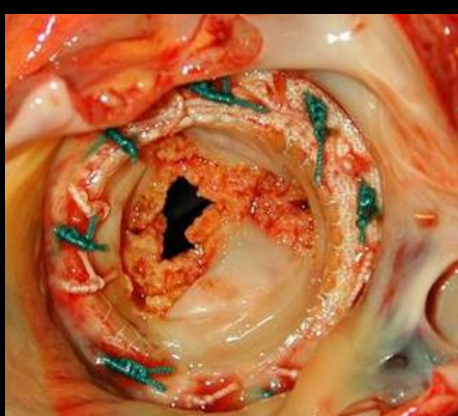
(*) due to the risk of sudden clinical deterioration if further leaflet tearing occurs.

Valvular Heart Disease: Changing Concepts in Disease Management

Surgery for Infective Endocarditis
Who and When?

Bernard D. Prendergast, DM, FRCP; Pilar Tornos, MD, FESC

1. Surgery in Active Endocarditis   MJ Dinubile – Ann Int Med 1982
2. Duke Criteria.   DT Durack – Am J Med 1994
3. Infective Endocarditis.   LM Baddour - Circulation 2005



Circulation. 2010;121:1141-1152

Table 2. Indications for Surgery in IE

Circulation. 2010;121:1141-1152

Congestive heart failure*

- Congestive heart failure caused by severe aortic or mitral regurgitation or, more rarely, by valve obstruction caused by vegetations
- Severe acute aortic or mitral regurgitation with echocardiographic signs of elevated left ventricular end-diastolic pressure or significant pulmonary hypertension
- Congestive heart failure as a result of prosthetic dehiscence or obstruction

Periannular extension

- Most patients with abscess formation or fistulous tract formation

Systemic embolism†

- Recurrent emboli despite appropriate antibiotic therapy
- Large vegetations (>10 m
- Large vegetations and
- Very large vegetations

Cerebrovascular complic

- Silent neurological co
- Ischemic stroke and c coma)

Persistent sepsis

- Fever or positive bloo surgery persist and th
- Relapsing IE, especi

Difficult organisms

- *S aureus* IE invo
- IE caused by
- IE caused b es bacteria
- *Pseudom as aeruginosa*
- Fungal IE
- Q fever IE and other relative indications for intervention

Prosthetic valve endocarditis

- Virtually all cases of early prosthetic valve endocarditis
- Virtually all cases of prosthetic valve endocarditis caused by *S aureus*
- Late prosthetic valve endocarditis with heart failure caused by prosthetic dehiscence or obstruction, or other indications for surgery

*Surgery should be performed immediately, irrespective of antibiotic therapy, in patients with persistent pulmonary oedema or cardiogenic shock. If congestive heart failure disappears with medical therapy and there are no other surgical indications, intervention can be postponed to allow a period of days or weeks antibiotic treatment under careful clinical and echocardiographic observation. In patients with well tolerated severe valvular regurgitation or prosthetic dehiscence and no other reasons for surgery, conservative therapy under careful clinical and echocardiographic observation is recommended with consideration of deferred surgery after resolution of the infection, depending upon tolerance of the valve lesion.

†In all cases, surgery for the prevention of embolism must be performed very early since embolic risk is highest during the first days of therapy.

‡Surgery is contraindicated for at least one month after intracranial haemorrhage unless neurosurgical or endovascular intervention can be performed to reduce bleeding risk.

Prosthetic valve endocarditis

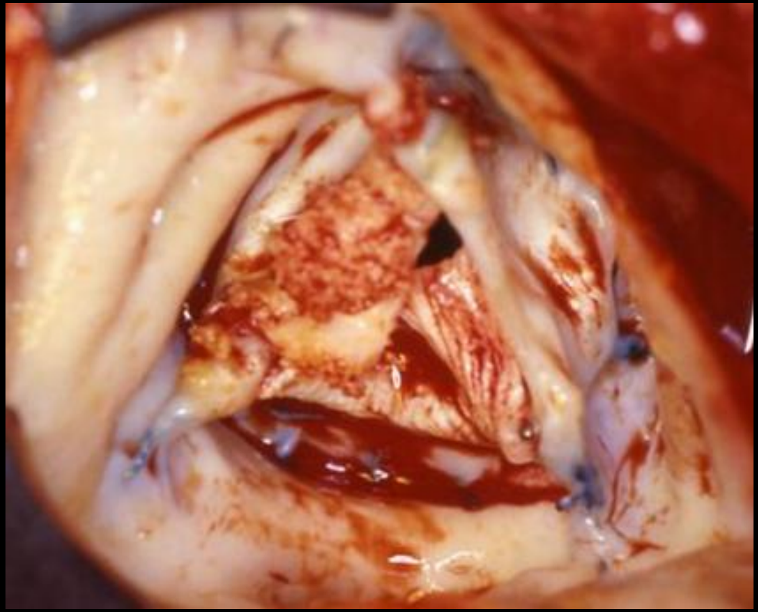
Virtually all cases of early prosthetic valve endocarditis

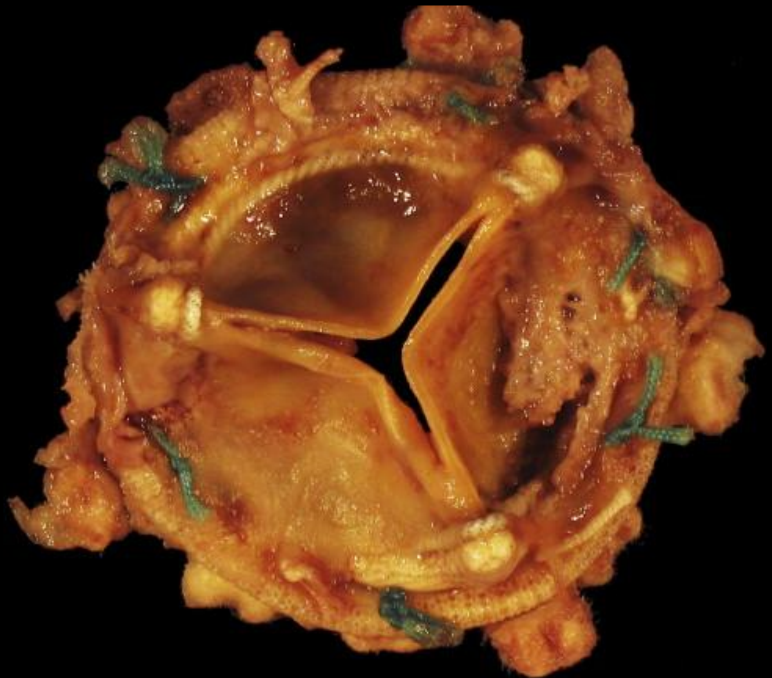
Virtually all cases of prosthetic valve endocarditis caused by *S. aureus, aggressive Gram neg, Fungal IE.*

Late prosthetic valve endocarditis with heart failure caused by prosthetic dehiscence or obstruction

Table 3. Timing of Surgery

Emergency surgery (within 24 hours)	
	Native (aortic or mitral) or prosthetic valve endocarditis and severe congestive heart failure or cardiogenic shock caused by:
	Acute valvular regurgitation
	Severe prosthetic dysfunction (dehiscence or obstruction)
	Fistula into a cardiac chamber or the pericardial space
Urgent surgery (within days)	
	Native valve endocarditis with persisting congestive heart failure, signs of poor hemodynamic tolerance, or abscess
	Prosthetic valve endocarditis with persisting congestive heart failure, signs of poor hemodynamic tolerance, or abscess
	Prosthetic valve endocarditis caused by staphylococci or Gram-negative organisms
	Large vegetation (>10 mm) with an embolic event
	Large vegetation (>10 mm) with other predictors of a complicated course
	Very large vegetation (>15 mm), especially if conservative surgery is available
	Large abscess and/or periannular involvement with uncontrolled infection
Early elective surgery (during the in-hospital stay)	
	Severe aortic or mitral regurgitation with congestive heart failure and good response to medical therapy
	Prosthetic valve endocarditis with valvular dehiscence or congestive heart failure and good response to medical therapy
	Presence of abscess or periannular extension
	Persisting infection when extracardiac focus has been excluded
	Fungal or other infections resistant to medical cure





Circulation. 2010;121:1141-1152

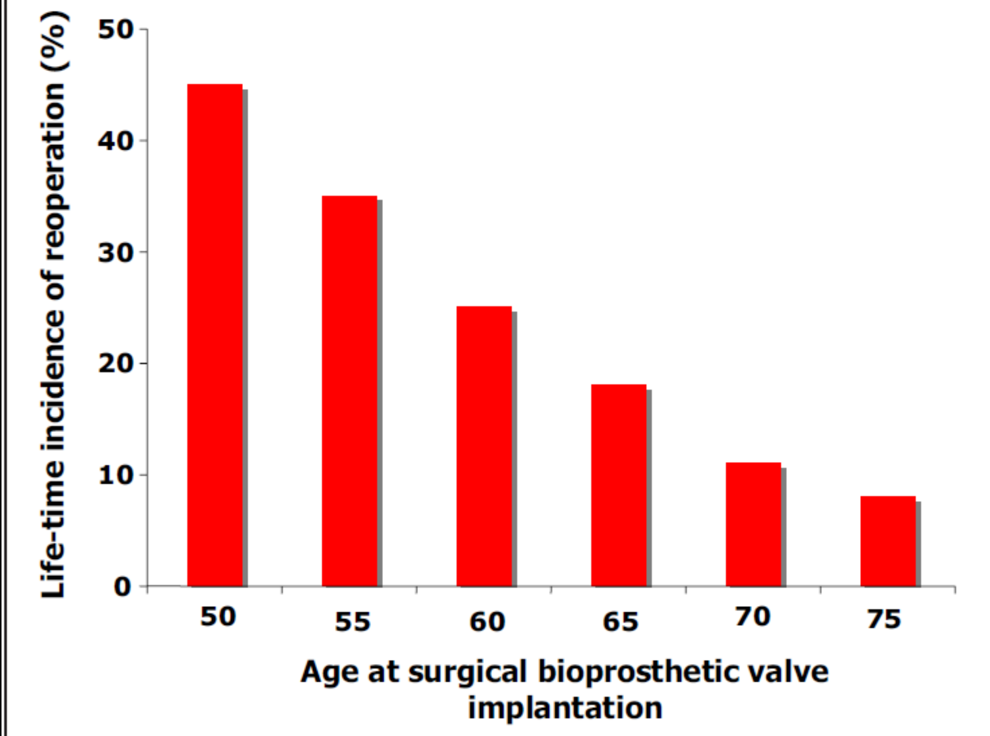


Figure 1. Lifetime Risk of Reoperation as a Function of Age

The lifetime risk of reoperation decreases with increasing patient age at the time of implantation.

More specifically, the lifetime incidence of reoperation can be as high as 45% and 25% in those patients with a primary operation at 50 and 60 years of age, respectively.

Re-operation

Piazza N. et al. J Am Coll Cardiol Intv 2011;4:721–32

Heart Valve Bioprostheses

Prosthetic valve malfunction

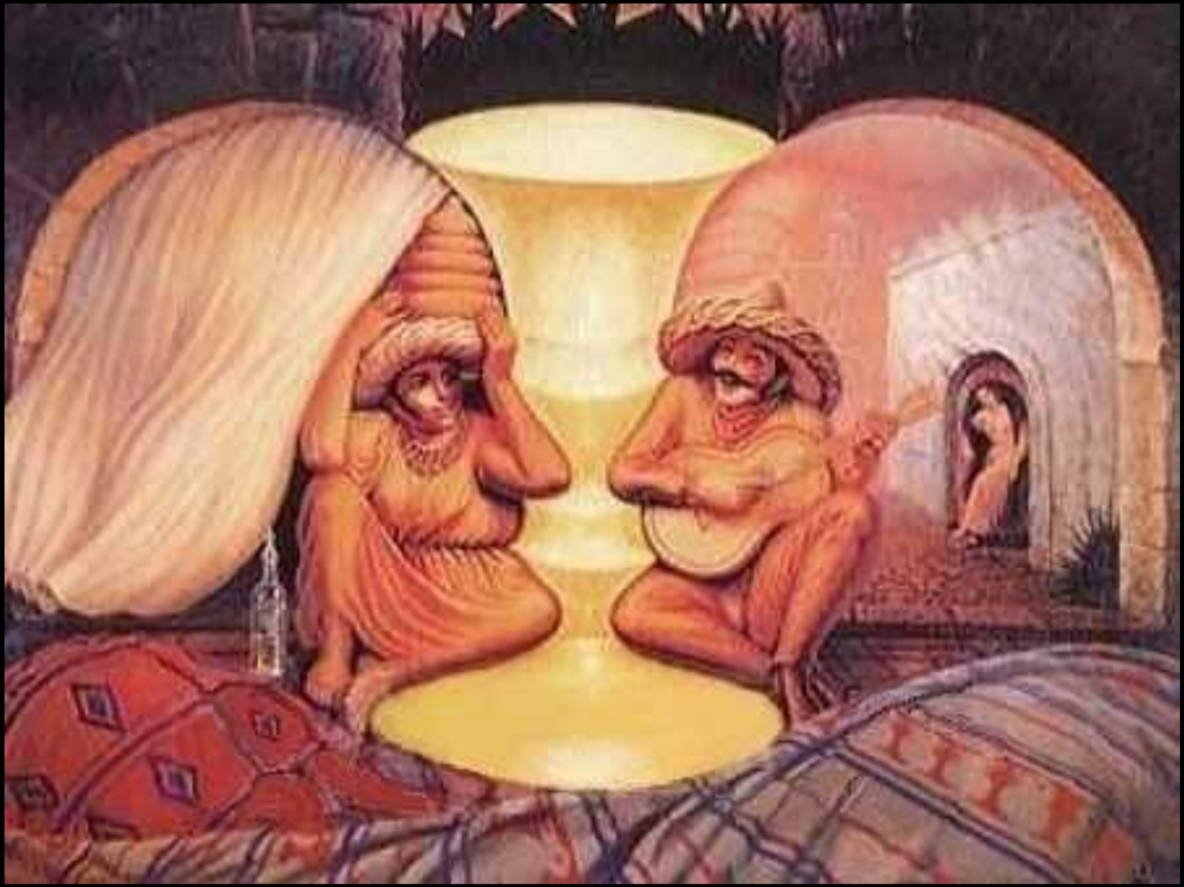
Diagnosis and f-up of bioprosthetic valve malfunction

Indication for reoperation

Risk assessment, special issue & results

Alternative emerging strategies

Operative risk evaluation in potential surgical candidates



Operative risk scoring algorithms are currently being used to identify the appropriate patient population for cardiac surgical therapies.

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Key Resources

- STS Annual Meeting Online
- STS Public Reporting Online
- Short-Term Risk Calculator
- ASCERT Long-Term Survival

Online STS Risk Calculator

Dataset: 2.73

Definitions | Support

Help | More about Risk Calculator | New | Print

Today's Date 4/21/2014

Procedure

Coronary Artery Bypass	Yes / No / **Missing** (selected)
Valve Surgery	Yes / No / **Missing** (selected)
VAD Implanted or Removed	No / Yes, implanted / Yes, explanted / Yes, implanted and explanted / **Missing** (selected)
Other Non-Cardiac Procedure	Yes / No / **Missing** (selected)
Unplanned Procedure	No / Yes, unsuspected patient disease or anatomy / Yes, surgical complication / **Missing** (selected)
Other Cardiac Procedure	Yes / No / **Missing** (selected)

Calculations

- Procedure Name
- Risk of Mortality
- Morbidity or Mortality
- Long Length of Stay
- Short Length of Stay
- Permanent Stroke
- Prolonged Ventilation
- DSW Infection
- Renal Failure
- Reoperation

euroSCORE for doctors
euroSCORE for patients
calculator
references

HOME euroSCORE SCORING CALCULATOR REFERENCES

euroSCORE interactive calculator

Important: The previous additive [1] and logistic [2] EuroSCORE models are out of date. A new model has been prepared from fresh data and is launched at the 2011 EACTS meeting in Lisbon. The model is called EuroSCORE II [3] this online calculator has been updated to use this new model. If you need to calculate the older "additive" or "logistic" EuroSCORE please visit the old calculator by clicking here.

Patient related factors			Cardiac related factors		
Age [1] (years)	0	0	NYHA	select	0
Gender	select	0	CCS class 4 angina [8]	no	0
Renal impairment [2] *See calculator below for creatinine clearance*	normal (CC >85ml/min)	0	LV function	select	0
Extracardiac arteriopathy [3]	no	0	Recent MI [9]	no	0
Poor mobility [4]	no	0	Pulmonary hypertension [10]	no	0
Previous cardiac surgery	no	0	**Operation related factors**		
Chronic lung disease [5]	no	0	Urgency [11]	elective	0
Active endocarditis [6]	no	0	Weight of the intervention [12]	isolated CABG	0
Critical preoperative state [7]	no	0	Surgery on thoracic aorta	no	0
Diabetes on insulin	no	0			
EuroSCORE II ***Euro*SCORE II**	0				
Note: This is the 2011 EuroSCORE II	Calculate	Clear			

Are all the variables captured in Risk-Predictors models ?

- ✓ Rare conditions (i.e. amount of adhesions, mediastinal radiation, scoliosis, pericarditis, etc.)
- ✓ Covariates (i.e. quality of target vessels, calcified ascending aorta, tissue fragility, etc.)
- ✓ Surgeon/hospital experience and management quality (ICU)

HOSPITAL VOLUME AND SURGICAL MORTALITY IN THE UNITED STATES

JOHN D. BIRKMEYER, M.D., ANDREA E. SIEWERS, M.P.H., EMILY V.A. FINLAYSON, M.D., THERESE A. STUKEL, PH.D., F. LEE LUCAS, PH.D., IDA BATISTA, B.A., H. GILBERT WELCH, M.D., M.P.H., AND DAVID E. WENNBERG, M.D., M.P.H.

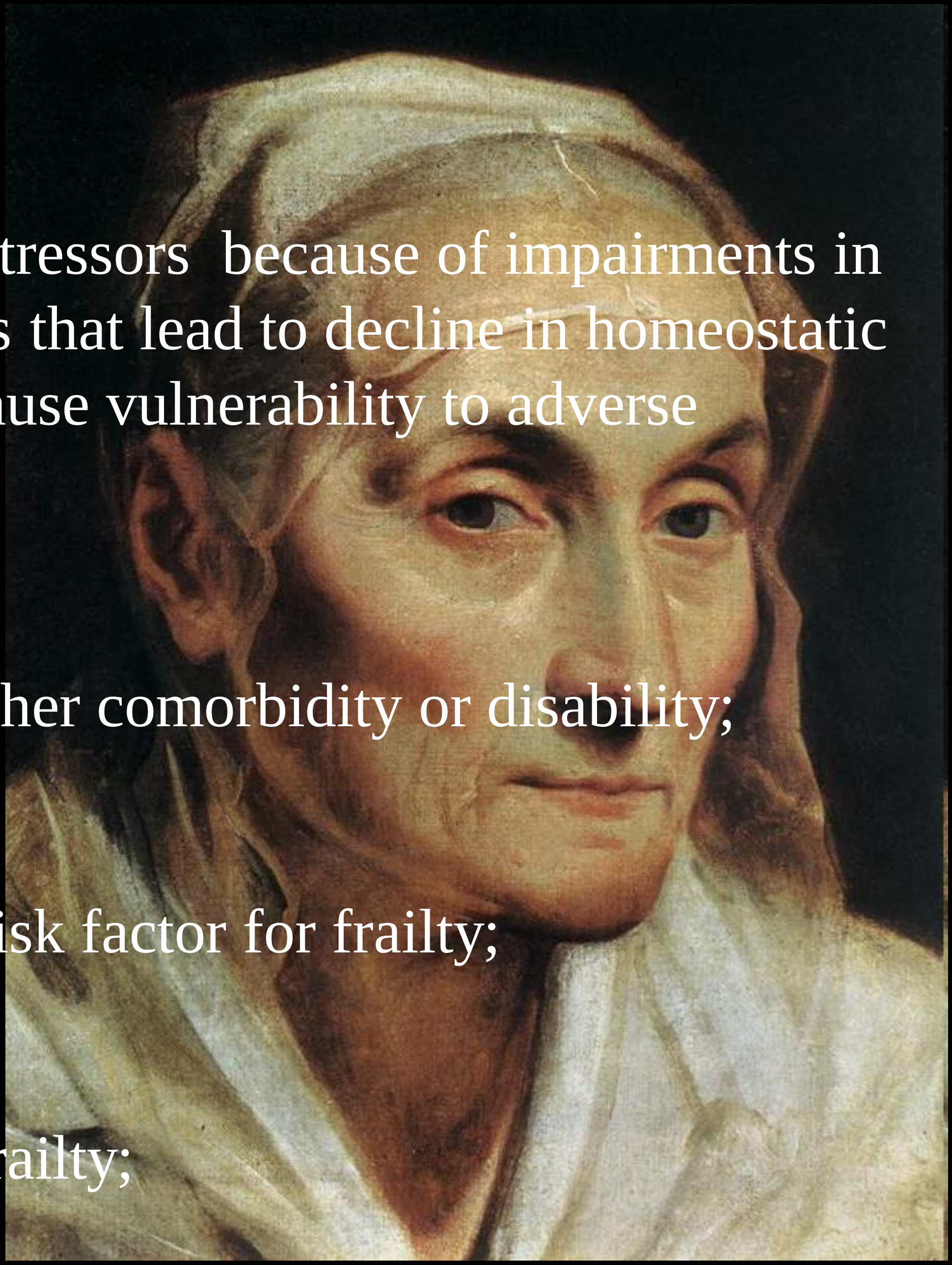
The NEW ENGLAND JOURNAL of MEDICINE 2002;346:1128-37

Mortality rates may be 33% higher in centers with low volume than in centers with the highest surgical volume.


M.R. 83aa


G.A. 81aa

FRAILTY



Increased *vulnerability* to stressors because of impairments in multiple inter-related systems that lead to decline in homeostatic reserve and resiliency, and cause vulnerability to adverse outcomes;

It is not synonymous with either comorbidity or disability;

Comorbidity is an etiologic risk factor for frailty;

Disability is an outcome of frailty;

The estimation of frailty in inpatients is of crucial importance and may inform decisions on management and prognosis

Phenotype model of Frailty (Fried et al.)

Pursers' performance-based measures (Pursers et al.)

Edmonton Frail Scale

Reported Edmonton Frail Scale (REFS)

Geriatrician's Clinical Impression of Frialty (GCIF)

Charlson Comorbidity Index (CCMD)

Katz Daily Living Scale (KATZ)

Frailty domain

- Cognition
- General health status
- Functional independence
- Social support
- Medication use
- Nutrition
- Mood
- Continence
- Self-reported performance

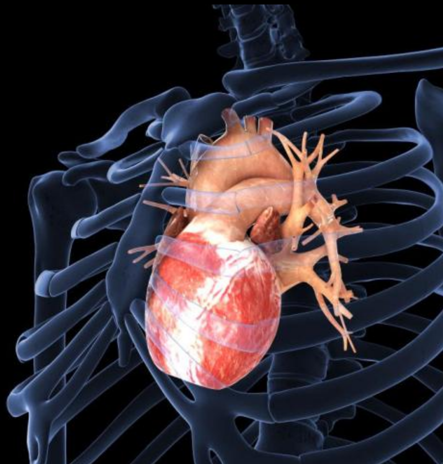
Risk of operative mortality in redo cardiac operations

meta-analysis

Older age (>70 years),
female sex,
diabetes mellitus,
chronic obstructive pulmonary disease,
renal failure or elevated baseline serum creatinine (>2 mg/100 mL),
pulmonary hypertension
history of stroke,
elevated BMI

Contribute to a higher mortality:
repeat valvular surgery for prosthetic valve endocarditis,
low left ventricular EF (~20%),
urgent operation

number of previous operations



Special issues in redo cardiac surgery

Redo Sternotomy /Re-entry strategy / Adhesion

Institution of Cardio-pulmonary Bypass

Calcified Ascending Aorta

Surgical Dissection

Patent coronary grafts

Myocardial protection

Exposure (aortic root / left atrium)

LV venting

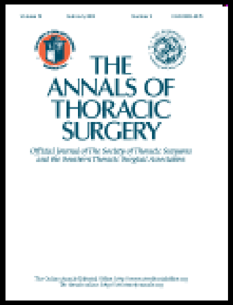
De-airing the heart

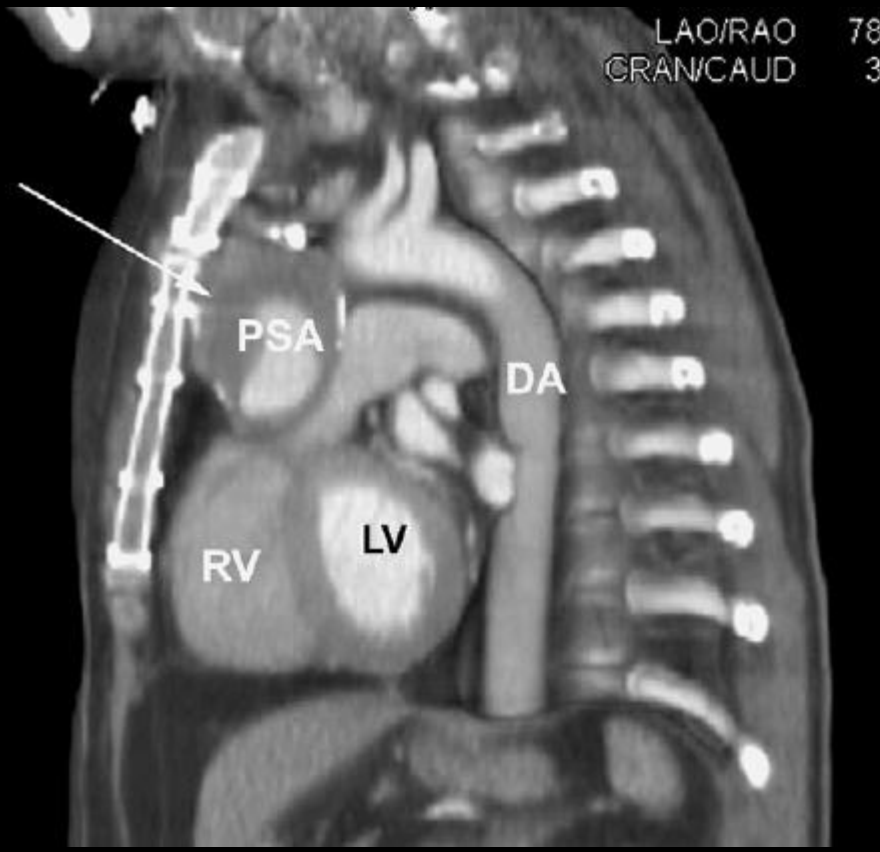
Bleeding control

Multidetector Computed Tomographic Angiography in Planning of Reoperative Cardiothoracic Surgery

Apur R. Kamdar, MD, Telly A. Meadows, MD, Eric E. Roselli, MD, Eiran Z. Gorodeski, MD, MPH, Ronan J. Curtin, MD, Joseph F. Sabik, MD, Paul Schoenhagen, MD, Richard D. White, MD, Bruce W. Lytle, MD, Scott D. Flamm, MD, and Milind Y. Desai, MD

Departments of Cardiovascular Medicine, Thoracic and Cardiovascular Surgery, and Radiology, Cleveland Clinic, Cleveland, Ohio; and Department of Radiology, University of Florida, Jacksonville, Florida





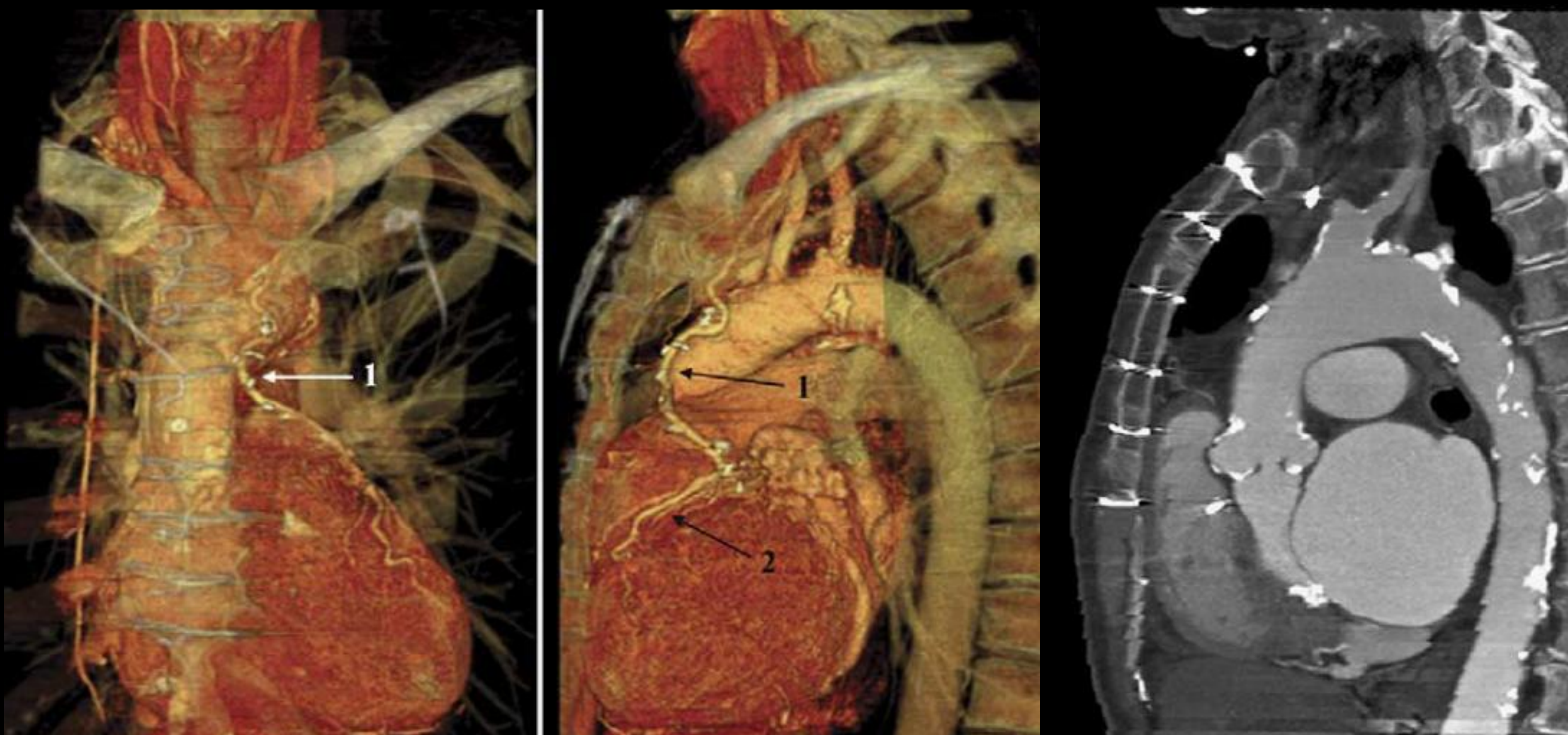
Routine use of preoperative MDCTA to detect high-risk findings has a strong association with adoption of preventive surgical strategies in high-risk patients undergoing redo cardiac surgery.

Ann Thorac Surg 2008;85:1239–46

Three dimensional computed tomographic imaging in planning the surgical approach for redo cardiac surgery after coronary revascularization

Hrvoje Gasparovic[a], Frank J. Rybicki[b], John Millstine[b], Daniel Unic[a], John G. Byrne[a], Kent Yucel[b], Tomislav Mihaljevic[a,*]

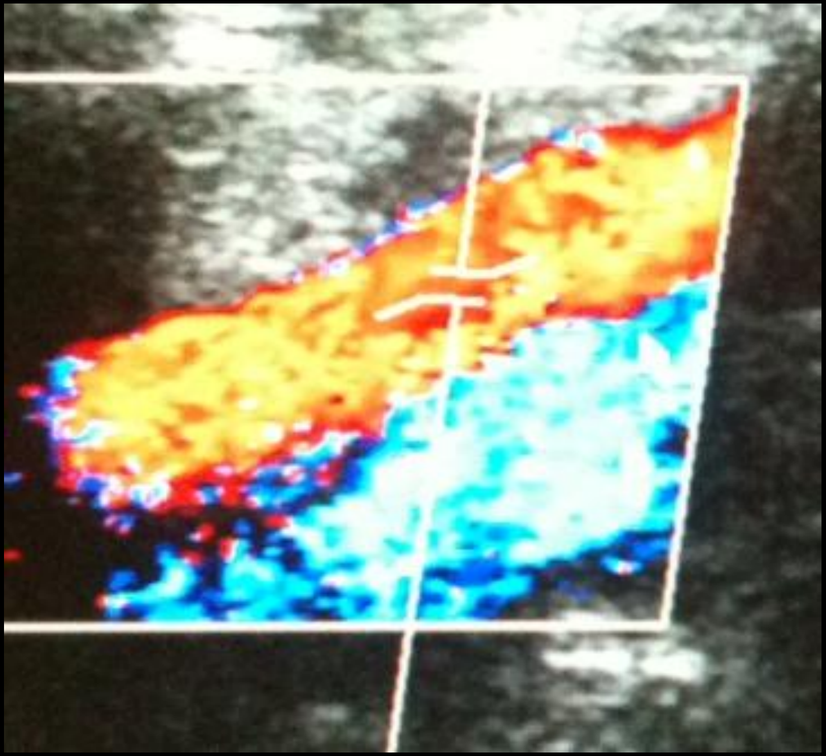
[a]Division of Cardiac Surgery, Brigham and Women's Hospital, Boston, MA, USA
[b]Department of Radiology, Brigham and Women's Hospital, Boston, MA, USA



European Journal of Cardio-thoracic Surgery 28 (2005) 244–249

Diagnostic assessment: femoral vessels patency

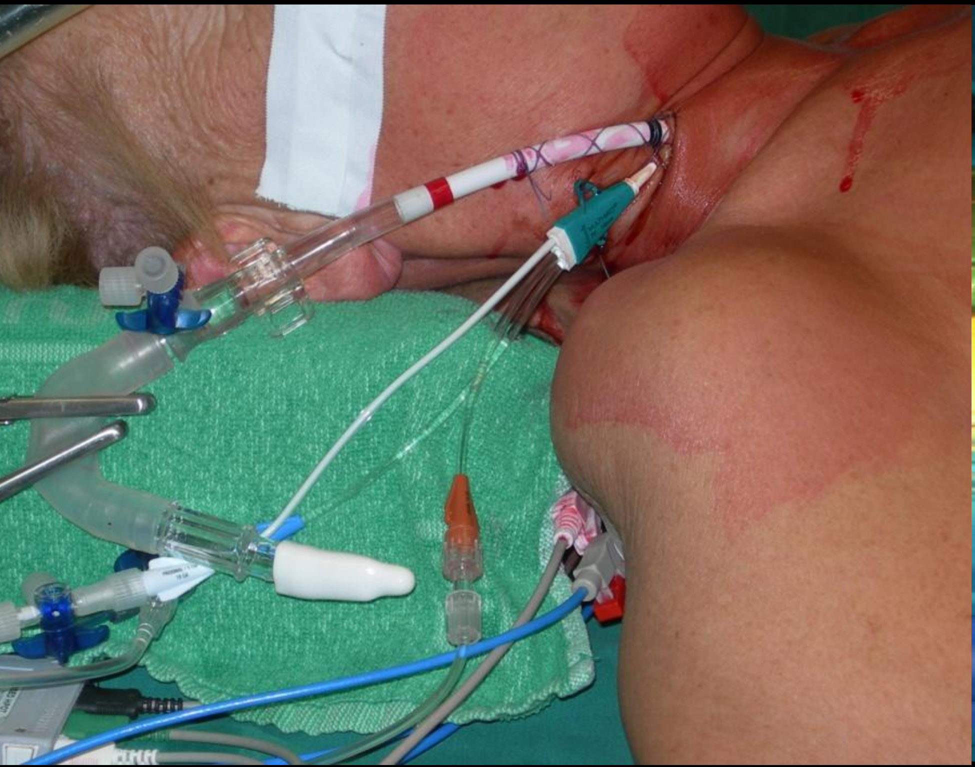
echocolordoppler

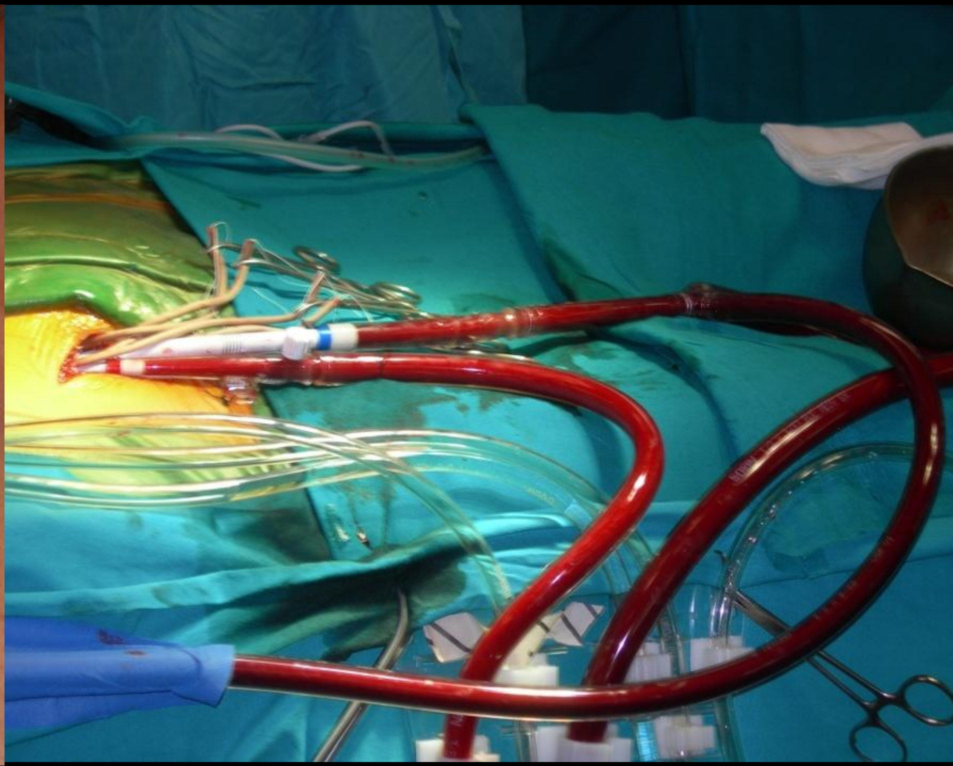


angiography

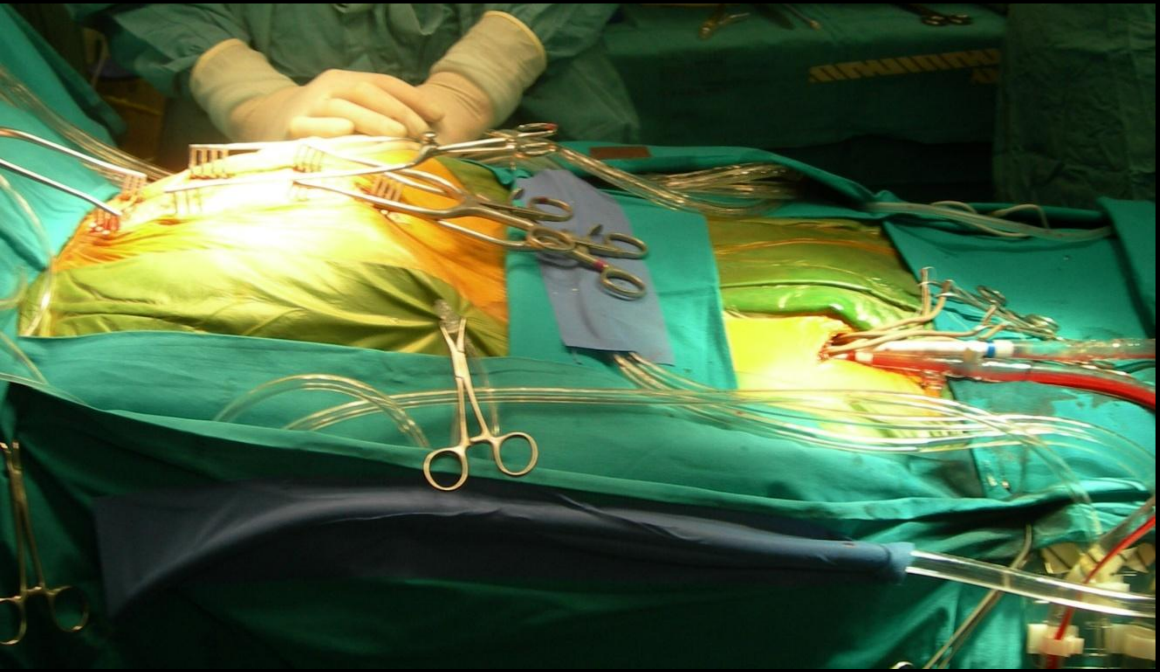
periferal vessels suitability for CPB cannulation

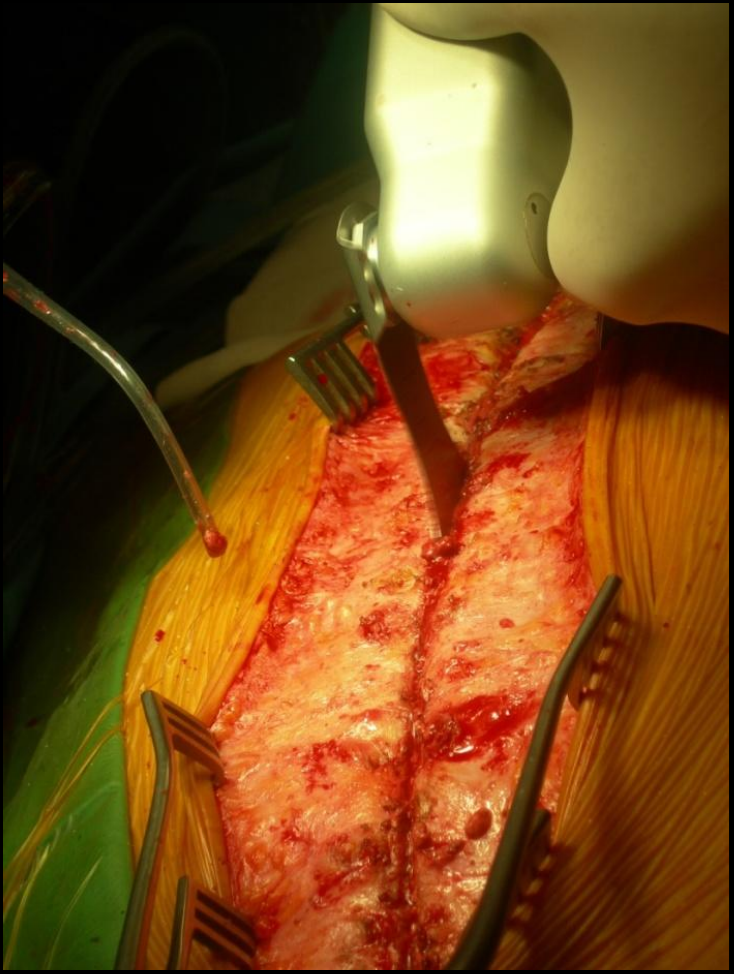
Periferal Cardiopulmonary Bypass



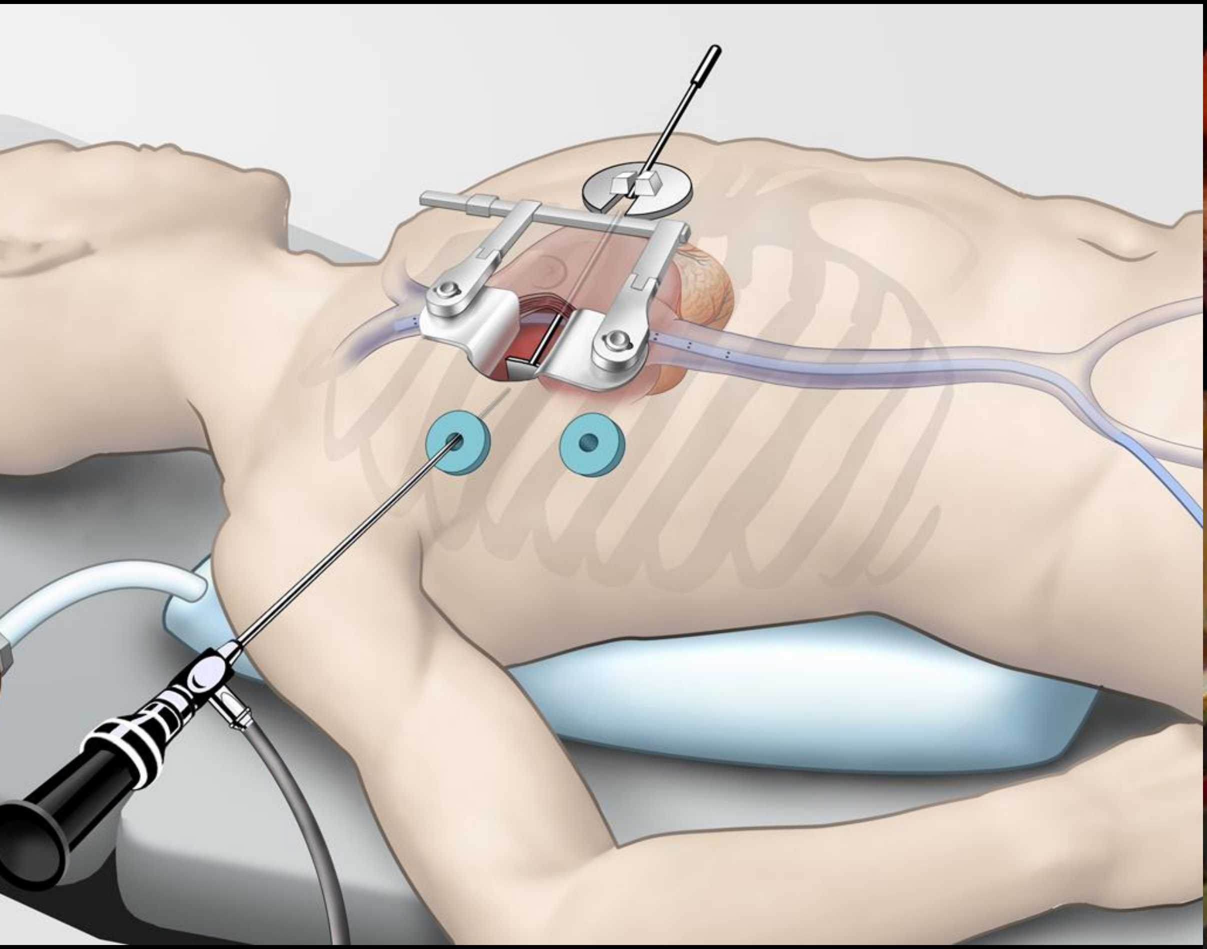


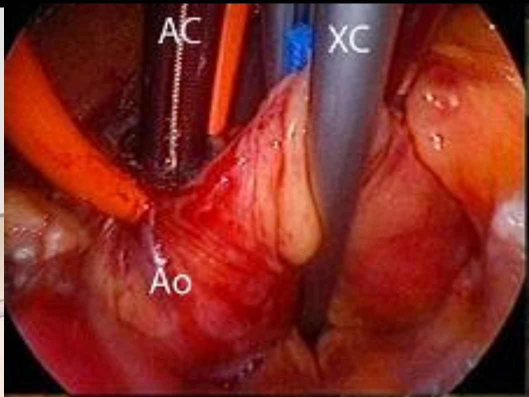
Periferal Cardiopulmonary Bypass

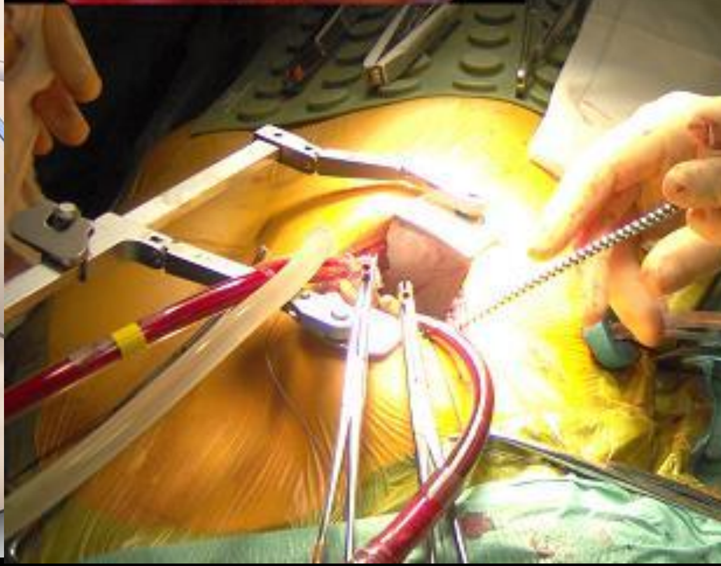




Alternative less invasive approaches







Mid-term results of aortic valve surgery in redo scenarios in the current practice: results from the multicentre European RECORD (REdo Cardiac Operation Research Database) initiative[†]

Francesco Onorati[a,*], Fausto Biancari[b], Marisa De Feo[c], Giovanni Mariscalco[d], Antonio Messina[e], Giuseppe Santarpino[f], Francesco Santini[g], Cesare Beghi[d], Giannantonio Nappi[c], Giovanni Troise[e], Theodor Fischlein[f], Giancarlo Passerone[g], Juni Heikkinen[b] and Giuseppe Faggian[a]

Early-to-mid-term results and determinants of mortality in 711 cases of RAVR from seven European institutions;
Overall hospital mortality 5.1% (CV hospital mortality 4.6%)
Preoperative LVEF <30%, MRCVCs, CPB-time, periop LCOS and ARI predicted hospital death.

Table 3: Outcomes in high-risk subgroups

Variable	n (%)		P-value	n (%)		P-value	n (%)		P-value	n (%)		P-value
	Age >75 years (243 patients)	Age ≤75 years (468 patients)		NYHA IV (109 patients)	NYHA I–III (602 patients)		Urgent/emergent (192 patients)	Elective (519 patients)		Endocarditis (154 patients)	No endocarditis (557 patients)	
Mortality	7 (2.9)	29 (6.2)	0.06	9 (8.3)	27 (4.5)	0.09	20 (10.4)	16 (3.1)	<0.01	15 (9.7)	21 (3.8)	<0.01
MRCVCs	10 (4.1)	25 (5.3)	0.47	12 (11.0)	23 (3.8)	<0.01	23 (12.0)	12 (2.3)	<0.01	15 (9.7)	20 (3.6)	<0.01
Revision for bleeding	17 (7.0)	32 (6.8)	0.93	11 (10.1)	38 (6.3)	0.15	15 (7.8)	34 (6.6)	0.56	14 (9.1)	35 (6.3)	0.22
Permanent PMK	40 (16.5)	50 (10.7)	0.03	14 (13.0)	76 (12.6)	0.92	29 (15.1)	61 (11.8)	0.24	31 (20.1)	59 (10.6)	<0.01
Acute myocardial infarction	4 (1.6)	16 (3.4)	0.17	4 (3.7)	16 (2.7)	0.54	7 (3.7)	13 (2.5)	0.41	4 (2.6)	16 (2.9)	0.86
Low cardiac output syndrome	40 (16.5)	69 (14.7)	0.55	30 (27.5)	79 (13.1)	<0.01	45 (23.4)	64 (12.3)	<0.01	40 (26.0)	69 (12.4)	<0.01
Perioperative IABP	14 (5.8)	33 (7.1)	0.51	15 (13.8)	32 (5.3)	<0.01	19 (9.9)	28 (5.4)	0.03	17 (11.0)	30 (5.4)	0.01
Prolonged intubation (>48 h)	43 (18.0)	72 (15.6)	0.41	33 (30.6)	82 (13.8)	<0.01	43 (22.5)	72 (14.1)	<0.01	41 (27.3)	74 (13.4)	<0.01
Acute respiratory failure	32 (13.6)	43 (9.2)	0.10	20 (18.5)	55 (9.2)	<0.01	25 (13.1)	50 (9.7)	0.19	23 (15.2)	52 (9.3)	0.04
Pneumonia	17 (7.0)	32 (6.9)	0.94	19 (17.4)	30 (5.0)	<0.01	23 (12.0)	26 (5.0)	<0.01	20 (13.0)	29 (5.2)	<0.01
Stroke	16 (6.6)	31 (6.7)	0.98	11 (10.2)	36 (6.0)	0.11	23 (12.0)	24 (4.6)	<0.01	18 (11.9)	29 (5.2)	<0.01
Acute renal insufficiency	53 (21.8)	84 (17.9)	0.22	30 (27.5)	107 (17.8)	0.02	51 (26.6)	86 (16.6)	<0.01	49 (31.8)	88 (15.8)	<0.01
CRRT	19 (7.8)	32 (6.8)	0.63	16 (14.7)	35 (5.8)	<0.01	21 (10.9)	30 (5.8)	0.02	19 (12.3)	32 (5.7)	<0.01
DSWI	4 (1.6)	6 (1.3)	0.69	3 (2.8)	7 (1.2)	0.19	4 (2.1)	6 (1.2)	0.35	2 (1.3)	8 (1.4)	0.89
Transfusions	156 (64.2)	320 (68.4)	0.26	76 (69.7)	400 (66.4)	0.50	156 (81.3)	320 (61.7)	<0.01	125 (81.2)	351 (63.0)	<0.01

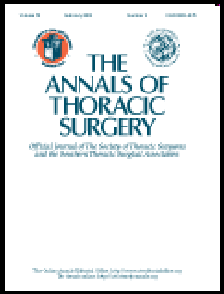
CRRT: continuous renal replacement therapy; DSWI: deep sternal wound infection; IABP: intra-aortic balloon pump; MRCVCs: major re-entry cardiovascular complications; PMK: pacemaker.

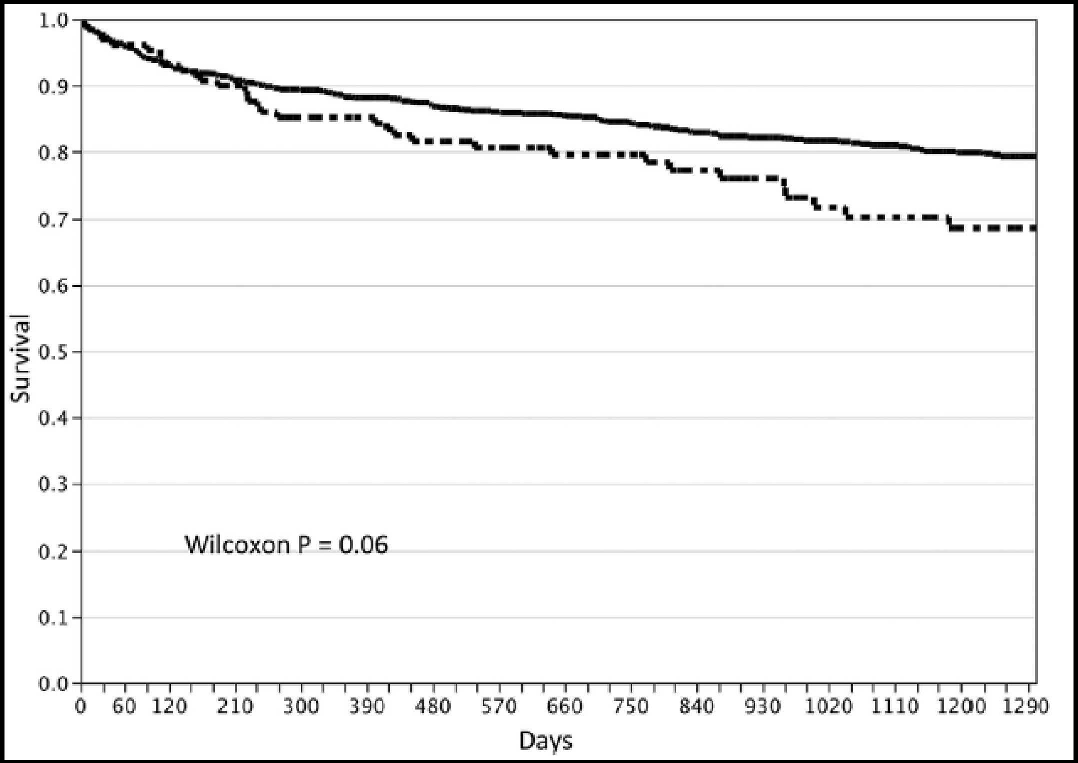
European Journal of Cardio-Thoracic Surgery (2014) March

Repeat Sternotomy: No Longer a Risk Factor in Mitral Valve Surgical Procedures

Mehrdad Ghoreishi, MD, Murtaza Dawood, MD, Gerald Hobbs, PhD, Chetan Pasrija, BS, Peter Riley, Lia Petrose, Bartley P. Griffith, MD, and James S. Gammie, MD

Division of Cardiac Surgery, University of Maryland School of Medicine, Baltimore, Maryland, and Department of Statistics, West Virginia University, Morgantown, West Virginia





Repeat sternotomy is the operation of choice for most patients with a previous sternotomy who require MV operation.

Ann Thorac Surg 2013;96:1358–66

Heart Valve Bioprostheses

Prosthetic valve malfunction

Diagnosis and f-up of bioprosthetic valve malfunction

Indication for reoperation

Risk assessment, special issue & results

Alternative emerging strategies


G.A. 81aa

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

Rick A. Nishimura, Catherine M. Otto, Robert O. Bonow, Blase A. Carabello, John P. Erwin III, Robert A. Guyton, Patrick T. O'Gara, Carlos E. Ruiz, Nikolaos J. Skubas, Paul Sorajja, Thoralf M. Sundt III and James D. Thomas

http://circ.ahajournals.org

Prostheic Valve Stenosis (fibrosis, calcification, thrombosis, PPM)

Class I

1. Repeat valve replacement is indicated for severe symptomatic prosthetic valve stenosis. ***(Level of Evidence: C)***

The use of transcatheter valve prostheses to treat bioprosthetic valve stenosis with a "valve-in-valve" approach is promising but is *not yet fully validated*.

Prosthetic Valve Regurgitation (leaflet deg/calcif., tear / perforation, parav. leak)

Class IIa

1. Surgery is reasonable for operable patients with severe symptomatic or asymptomatic bioprosthetic regurgitation. ***(Level of Evidence C)***

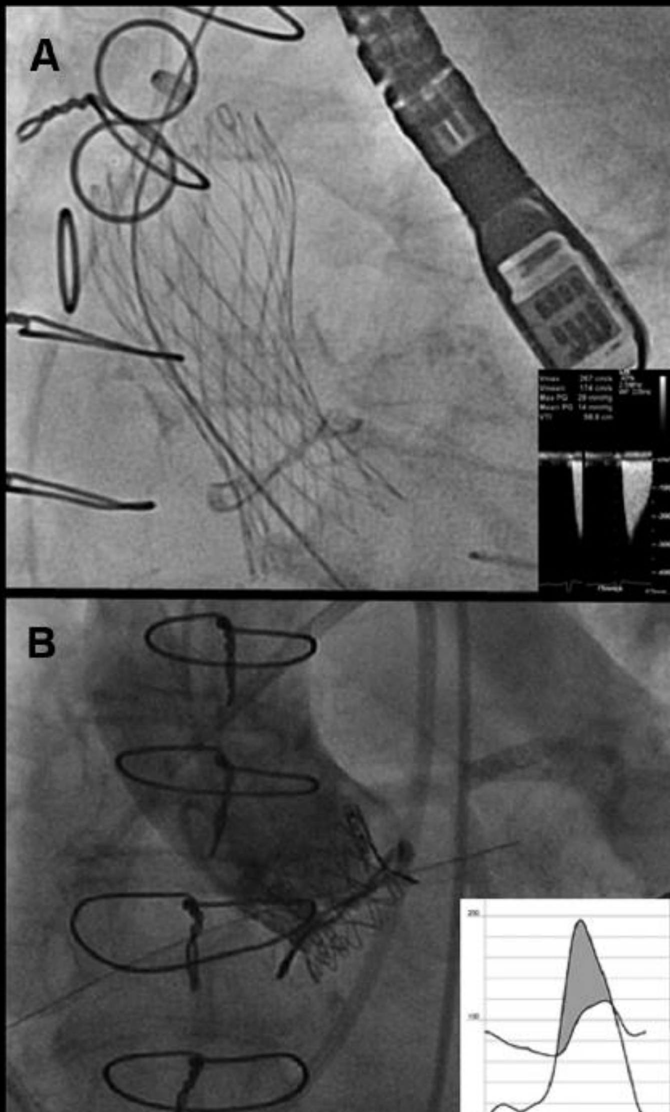
The use of transcatheter valve prostheses to treat bioprosthetic valve regurgitation with a "valve-in-valve" approach is promising but is *not yet fully validated*.

Transcatheter Aortic Valve Replacement for Degenerative Bioprosthetic Surgical Valves

Results From the Global Valve-in-Valve Registry

American Heart Association

Circulation 2012
126:
2335-2344



202 patients
Aged 77.7±10.4 years (52% men)
Stenosis (n85; 42%)
Regurgitation (n68; 34%)
Combined (n49; 24%)

CoreValve (n124)
Edwards SAPIEN (n78)

Procedural success was achieved in 93.1% of cases.

Device malposition (15.3%)
Ostial coronary obstruction (3.5%)

Valve maxi/mean gradients were 28.4±14.1/15.9±8.6 mmHg,
95% of patients had 1 degree of aortic regurgitation.

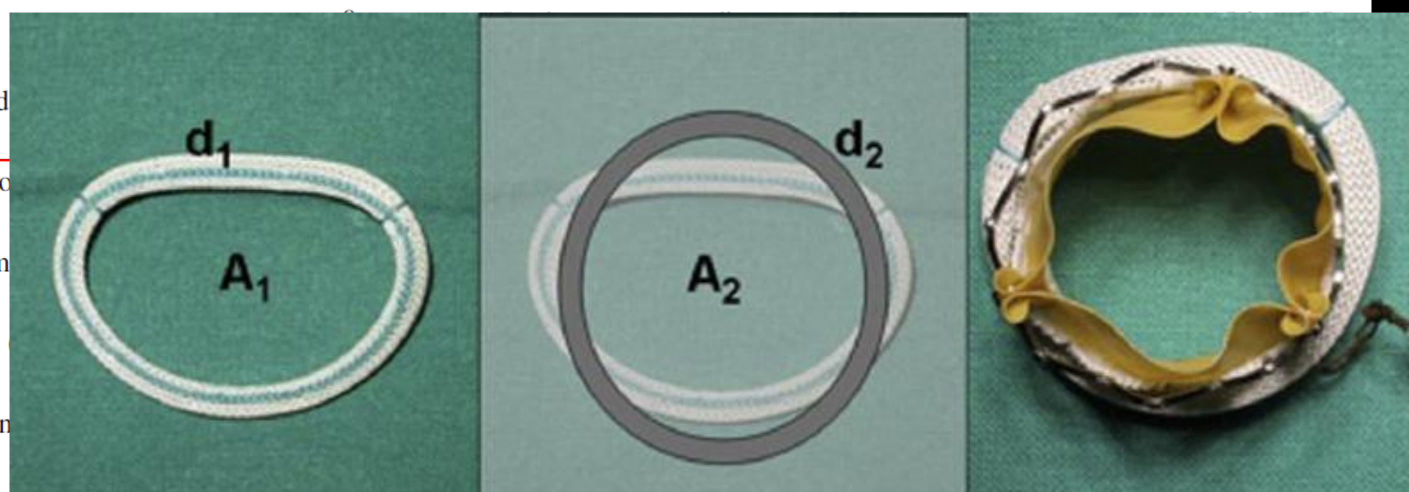
At 30-day follow-up, all-cause mortality was 8.4%,
84.1% of patients were at NYHA FC I/II.
One-year follow-up (87 pts) showed 85.8% survival.

Pushing the limits—further evolutions of transcatheter valve procedures in the mitral position, including valve-in-valve, valve-in-ring, and valve-in-native-ring

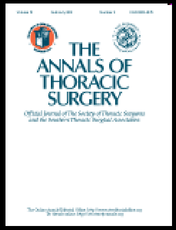
Manuel Wilbring, MD,[a] Konstantin Alexiou, MD,[a] Sems Malte Tugtekin, MD,[a] Sebastian Arzt, MD,[a] Karim Ibrahim, MD,[b] Klaus Matschke, MD,[a] and Utz Kappert, MD[a]

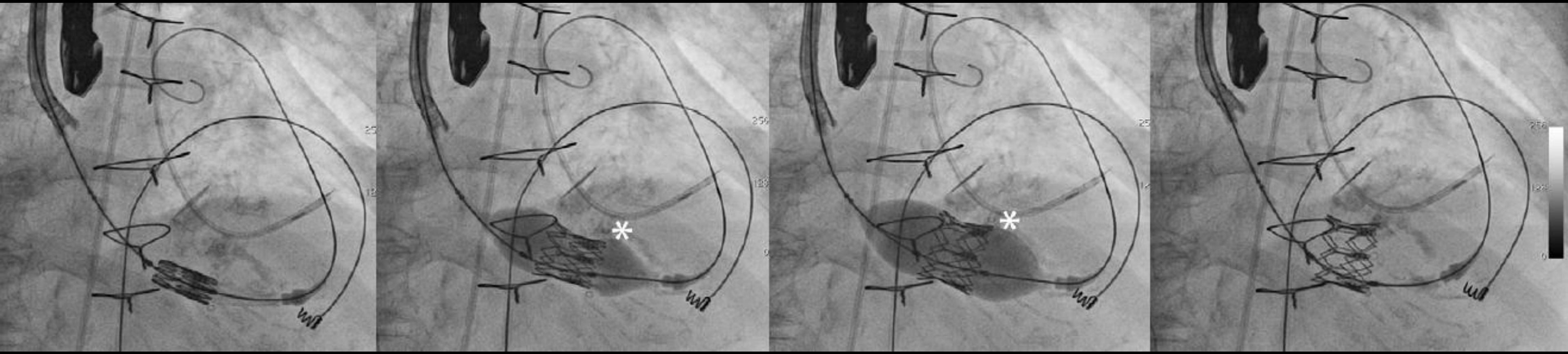
TABLE 2. Clinical endpoints according to Valve Academic Research Consortium-2 criteria* in all patients (n = 14)

Endpoint	Result
Procedural success (valve-in-valve/valve-in-ring)	13 (100.0)
Mean procedure time (valve-in-valve/valve-in-ring), min	51.1 ± 7.4
Immediate procedural mortality (<72 h after the procedure)	0
Procedural mortality (primary hospital stay)	2 (15.4)
Pneumonia on day 34	1
Fatal upper gastrointestinal bleeding on day 41	1
Mortality during further follow-up	0
Myocardial infarction	
Bleeding complications	
Vascular access site and access-related	
Acute kidney injury classification	
Renal failure (continuous veno-veno	
Stroke and transient ischemic attack	
Conduction disturbances and arrhythm	
New onset atrial fibrillation	
Permanent pacemaker implantation fibrillation)	
Other transcatheter aortic valve implan complications	
Rethoracotomy	1 (7.7)
Second-look for reanchoring the direct-view implanted transcatheter heart valve	1
Hospital stay, d	13.2 ± 11.3
Follow-up time, d	104 ± 69
Echocardiographic results for valve-in-valve-procedures	
No valvular regurgitation	9 (90.0)
Trace transvalvular regurgitation	1 (10.0)



Transjugular Tricuspid Valve-in-Valve Implantation:
A Safe and Effective Approach





71-year-old woman

Heart failure s/p triple valve replacement for RHD
27-mm Hancock II prosthesis severely stenotic (mean transvalve gradient, 13 mm Hg), moderately insufficient (3/4).

Cachectic, COPD, hepatic failure with ascites.
EuroSCORE 40.9.

Cerillo et al. Ann Thorac Surg 2011;92(2):777-8

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

Rick A. Nishimura, Catherine M. Otto, Robert O. Bonow, Blase A. Carabello, John P. Erwin III, Robert A. Guyton, Patrick T. O'Gara, Carlos E. Ruiz, Nikolaos J. Skubas, Paul Sorajja, Thoralf M. Sundt III and James D. Thomas

http://circ.ahajournals.org

Prosthetic Valve Regurgitation (paravalvula leak)

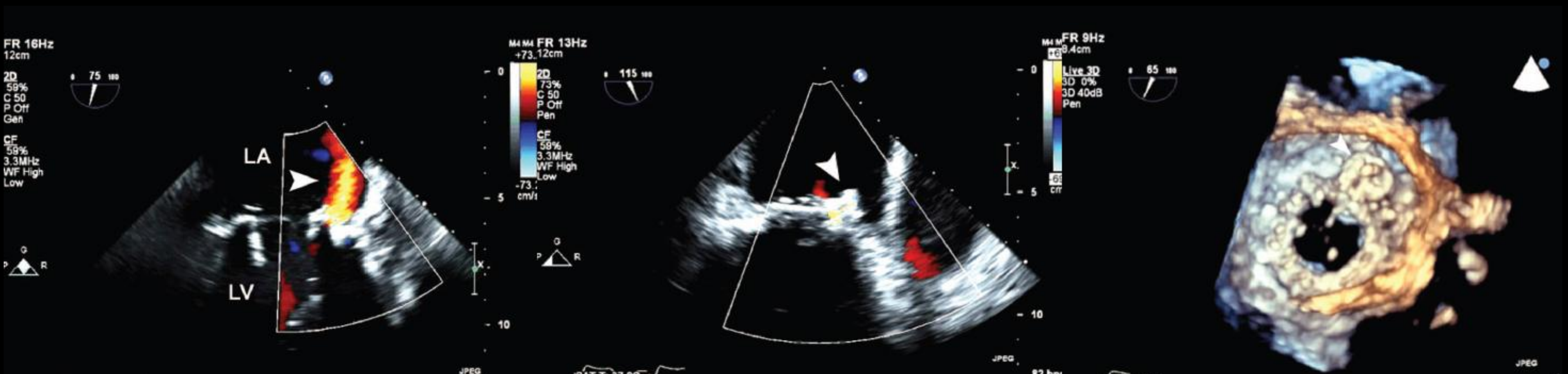
Class IIa

2. Percutaneous repair of paravalvular regurgitation is reasonable in patients with prosthetic heart valves and intractable hemolysis or NYHA class III/IV HF who are at high risk for surgery and have anatomic features suitable for catheter-based therapy when performed in centers with expertise in the procedure. *(Level of Evidence B)*

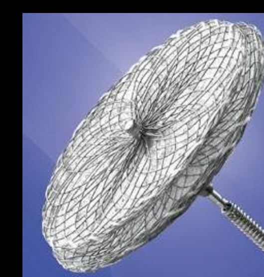
Centers of expertise under the guidance of a multidisciplinary team.

Percutaneous Repair of Paravalvular Prosthetic Regurgitation
Acute and 30-Day Outcomes in 115 Patients

Paul Sorajja, MD; Allison K. Cabalka, MD; Donald J. Hagler, MD; Charanjit S. Rihal, MD



141 paravalvular defects in 115 patients (age, 67$\pm$12 years; men, 53%);
Heart failure, hemolytic anemia, or both;
STS score for mortality, 6.9%;
Overall, successful percutaneous closure in 88 (77%) patients;
Overall, the 30-day complication rate was 8.7% (sudden and unexplained death, 1.7%; stroke, 2.6%; emergency surgery, 0.9%; bleeding, 5.2%).
Two devices embolized during the procedure and were retrieved without sequelae.
No procedural deaths occurred, but 2 (1.7%) patients died by 30 days.



Circ Cardiovasc Interv. 2011;4:314-321

Conclusions

There has been a shift toward a more extensive use of bioprostheses in both mitral and aortic position;

Patients who have undergone valve replacement are not cured but have exchanged native valve disease for *prosthetic valve disease*;

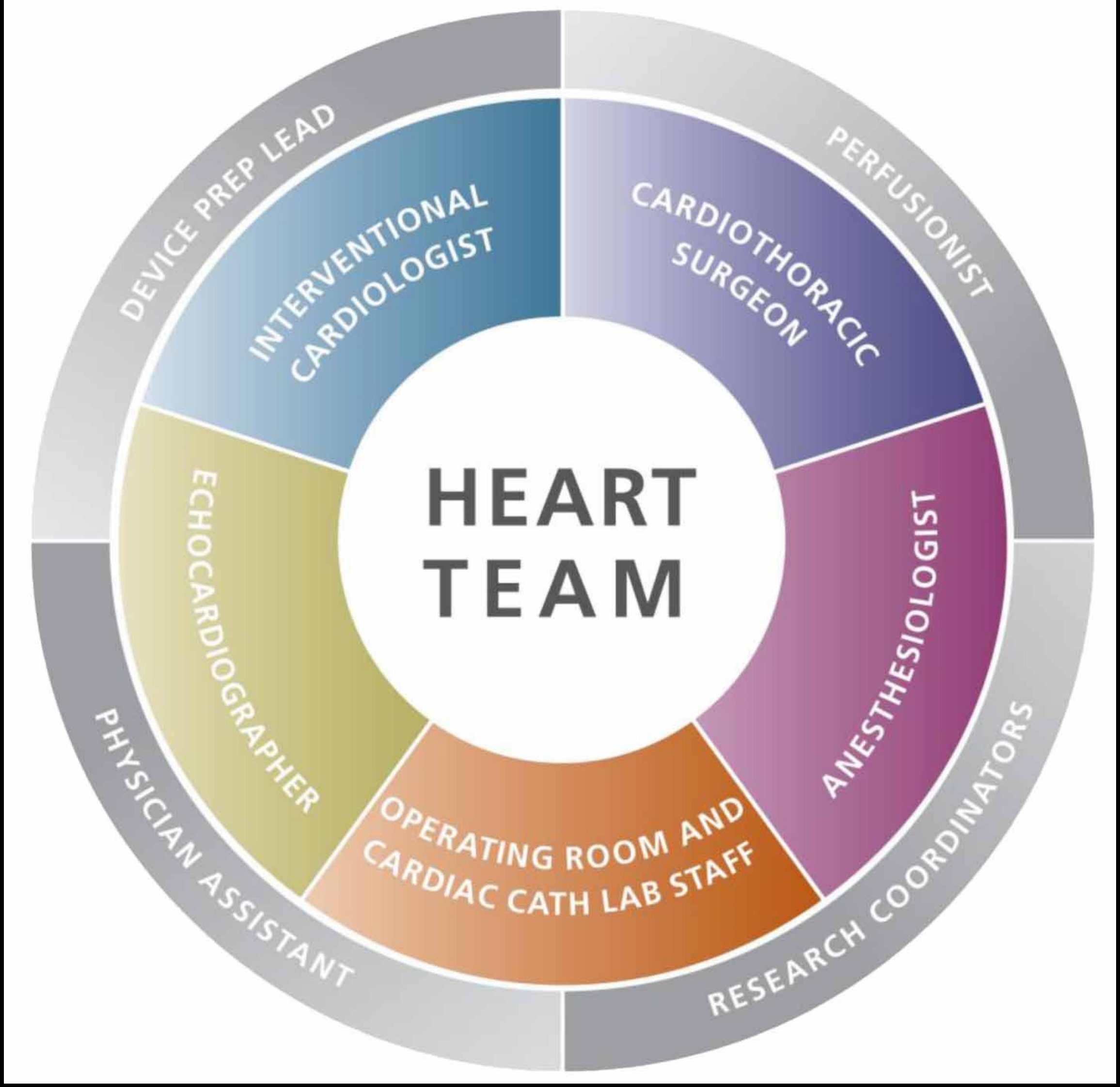
Appropriate schedule for clinical and echocardiographic follow-up (age / bioprosthetic valve degeneration time-lapse);

Need for quantitative or semiquantitative methods;

Surgical indications according to Guidelines;

Risk assessment, including *Frailty scores*;

Choice of the best procedures on an individual pt basis;



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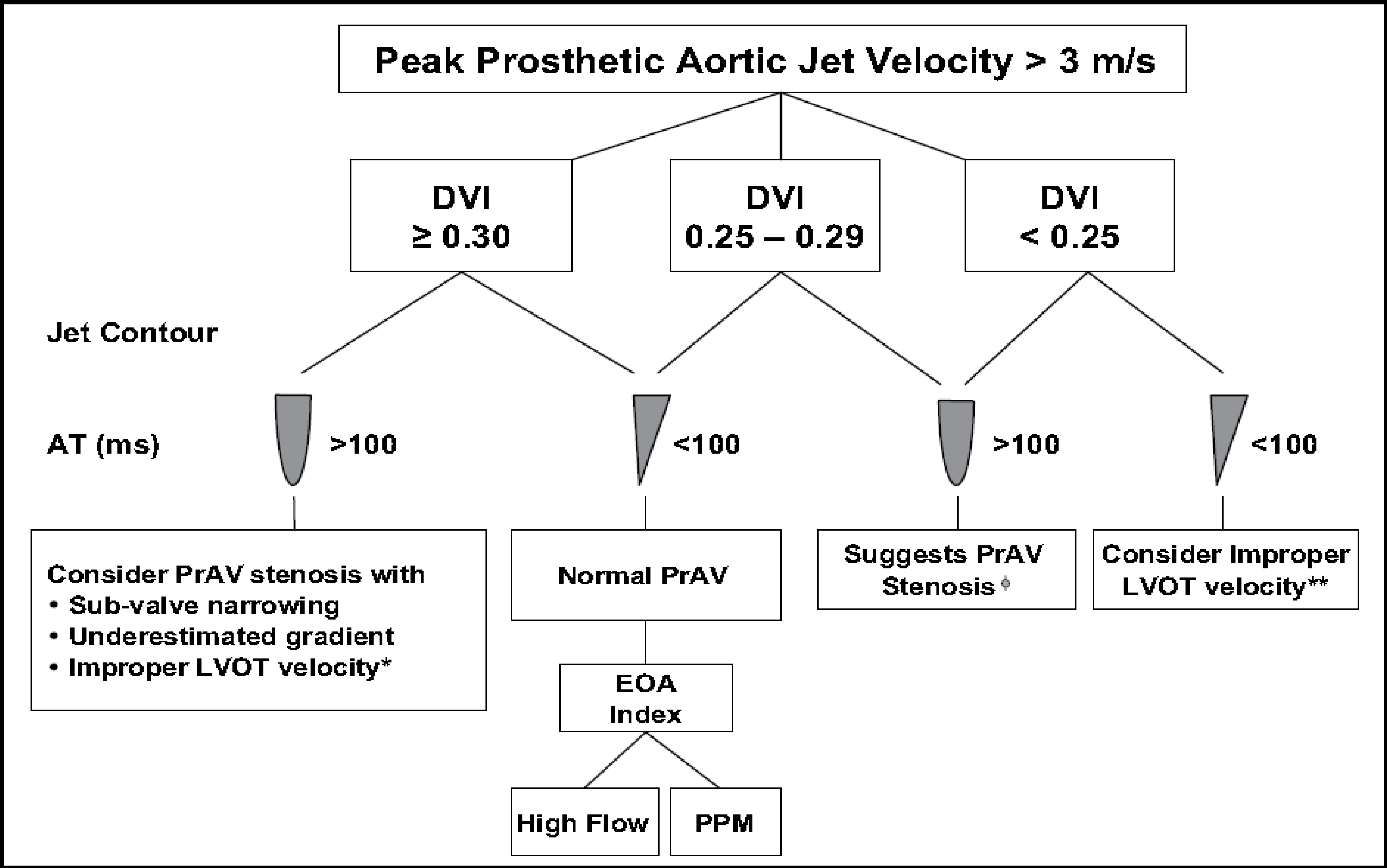
Diagnosis of Prosthetic Aortic Valve Stenosis

Doppler parameters of prosthetic aortic valve function in mechanical and stented biologic valves*			
Parameter	Normal	Possible stenosis	Suggests significant stenosis
Peak velocity (m/s)	<3	3-4	>4
Mean gradient (mm Hg)†	<20	20-35	>35
DVI	>0.29	0.29-0.25	<0.25
EOA (cm2)	>1.2	1.2-0.8	<0.8
Contour of the jet velocity through the PrAV	Triangular, early peaking	Triangular to intermediate	Rounded, symmetrical contour
AT (ms)	<80	80-100	>100

Algorithm for evaluation of elevated peak prosthetic aortic jet velocity



Doppler parameters of prosthetic mitral valve function/stenosis

	Normal*	**Possible stenosis‡**	**Suggests significant stenosis* ‡**
Peak velocity (m/s)†	<1.9	1.9-2.5	>2.5
Mean gradient (mm Hg)†	<6	6-10	>10
VTIPrMv/VTILVO	<2.2	2.2-2.5	>2.5
EOA (cm2)	>2	1-2	<1
PHT (ms)	<130	130-200	>200

Echo/Doppler Criteria for Severity of Prosthetic AR (TTE/TEE)

Parameter	Mild	Moderate	Severe
Valve Structure/Function	Normal	Abnormal	Abnormal
LV size	Normal	Normal or Mild Dilation	Dilated
Jet width (%LVO diameter)	Narrow (≤25%)	Intermediate (26-64%)	Large (≥ 65%)
Jet density (CW doppler)	Incomplete or Faint	Dense	Dense
PHT, ms (CW doppler)	>500	Variable (200-500)	Steep (< 200)
Diastolic Flow Reversal (Descending Aorta)	Absent or Brief early diastolic	Intermediate	Prominent, holodisatolic
Regurgitant Volume (ml/beat)	< 30	30-59	>60
Regurgitant Fraction (%)	<30	30-50	>50

Echo/Doppler Criteria for Severity of Prosthetic MR (TTE/TEE)

Parameter	Mild	Moderate	Severe
LV size	Normal	NL or Dilated	Usually Dilated
Valve	Usually Normal	Abnormal	Abnormal
Color Flow Jet Area	Small, central jet (usually $<4\ cm^2$ or <20% of LA area)	Variable	Large, central jet (usually $>8cm^2$ or >40% of LA area)
Flow Convergence	None or Minimal	Intermediate	Large
Jet Density: CW	Incomplete/Faint	Dense	Dense
Jet Contour: CW	Parabolic	Usually Parabolic	Early peaking, triangular
Pulm Vein Flow	Systolic Dominance	Systolic Blunting	Systolic Flow Reversal
VC Width (cm)	<0.3	0.3-0.59	≥0.6
R vol (ml/beat)	<30	30-59	≥60
RF (%)	<30	30-49	≥50
EROA (cm^2)	<0.2	0.20-0.49	≥0.50