24ο Ετήσιο Σεμινάριο Συνεχιζόμενης Ιατρικής Εκπαίδευσης Νοσοκομείου «ο Ευαγγελισμός»

Αθήνα, 18-22 Φεβρουαρίου 2019

ΕΝΩΣΗ ΕΠΙΣΤΗΜΟΝΙΚΟΥ ΠΡΟΣΩΠΙΚΟΥ
ΝΟΣΟΚΟΜΕΙΟΥ «Ο ΕΥΑΓΓΕΛΙΣΜΟΣ» (Ε.Ε.Π.Ν.Ε.)

ΚΑΤΕΥΘΥΝΤΗΡΙΕΣ ΟΔΗΓΙΕΣ ΣΤΗ ΧΕΙΡΟΥΡΓΙΚΗ ΤΗΣ ΑΟΡΤΙΚΗΣ ΒΑΛΒΙΔΑΣ

Νικόλαος Α. Παπακωνσταντίνου
Ειδικευόμενος Χειρουργικής Θώρακα- Καρδιάς,
ΓΝΑ «Ο Ευαγγελισμός»- Οφθαλμιατρείο Αθηνών- Πολυκλινική,
Αθήνα 20/02/2019


24ο Ετήσιο Σεμινάριο Συνεχιζόμενης Ιατρικής Εκπαίδευσης Νοσοκομείου «Ο Ευαγγελισμός»
Αθήνα, 18 - 22 Φεβρουαρίου 2019
CHATHAM HOUSE
The London Conference

NOVARTIS

ΣΥΓΚΡΟΥΣΗ ΣΥΜΦΕΡΟΝΤΩΝ

None to declare!!!

RULES

1. you can....
2. you can't...
3. you can....
4. you can't

ESC European Society of Cardiology

European Heart Journal (2017) **38**, 2739–2791
doi:10.1093/eurheartj/ehx391

ESC/EACTS GUIDELINES

2017 ESC/EACTS Guidelines for the management of valvular heart disease

2017

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PRACTICE GUIDELINE

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease

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CLINICAL PRACTICE GUIDELINE: FOCUSED UPDATE

2017 AHA/ACC Focused Update of the 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease

2014
(2017)

CANADIAN CARDIOVASCULAR SOCIETY CONSENSUS CONFERENCE

Surgical Management of Valvular Heart Disease 2004*

2004

AMERICAN COLLEGE of CARDIOLOGY

ESC European Society of Cardiology

American Heart Association.

EACTS European Association For Cardio-Thoracic Surgery

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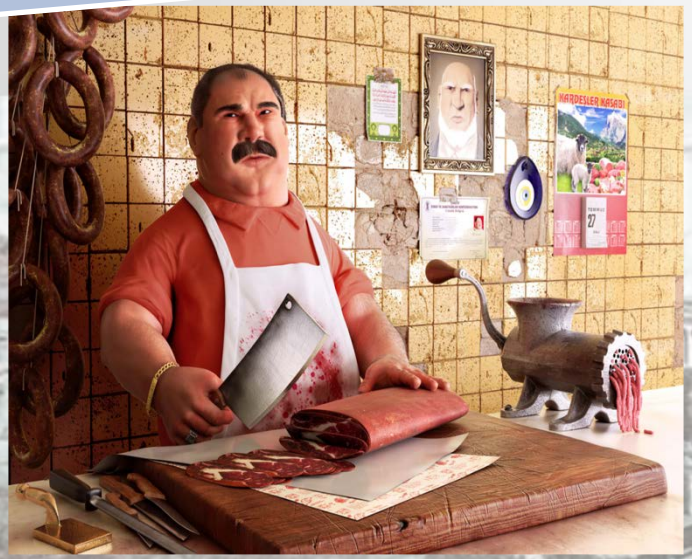
KARDESLER KASABI

CLASS (STRENGTH) OF RECOMMENDATION

CLASS I (STRONG) — **Benefit >>> Risk**

Suggested phrases for writing recommendations:
- Is recommended
- Is indicated/useful/effective/beneficial
- Should be performed/administered/other
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is recommended/indicated in preference to treatment B
  - Treatment A should be chosen over treatment B

CLASS IIa (MODERATE) — **Benefit >> Risk**

Suggested phrases for writing recommendations:
- Is reasonable
- Can be useful/effective/beneficial
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is probably recommended/indicated in preference to treatment B
  - It is reasonable to choose treatment A over treatment B

CLASS IIb (WEAK) — **Benefit ≥ Risk**

Suggested phrases for writing recommendations:
- May/might be reasonable
- May/might be considered
- Usefulness/effectiveness is unknown/unclear/uncertain or not well established

CLASS III: No Benefit (MODERATE) — **Benefit = Risk**
(Generally, LOE A or B use only)

Suggested phrases for writing recommendations:
- Is not recommended
- Is not indicated/useful/effective/beneficial
- Should not be performed/administered/other

CLASS III: Harm (STRONG) — **Risk > Benefit**

Suggested phrases for writing recommendations:
- Potentially harmful
- Causes harm
- Associated with excess morbidity/mortality
- Should not be performed/administered/other

LEVEL (QUALITY) OF EVIDENCE‡

LEVEL A
- High-quality evidence‡ from more than 1 RCT
- Meta-analyses of high-quality RCTs
- One or more RCTs corroborated by high-quality registry studies

LEVEL B-R (Randomized)
- Moderate-quality evidence‡ from 1 or more RCTs
- Meta-analyses of moderate-quality RCTs

LEVEL B-NR (Nonrandomized)
- Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies
- Meta-analyses of such studies

LEVEL C-LD (Limited Data)
- Randomized or nonrandomized observational or registry studies with limitations of design or execution
- Meta-analyses of such studies
- Physiological or mechanistic studies in human subjects

LEVEL C-EO (Expert Opinion)

Consensus of expert opinion based on clinical experience

COR and LOE are determined independently (any COR may be paired with any LOE).

A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

* The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).

† For comparative-effectiveness recommendations (COR I and IIa; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

‡ The method of assessing quality is evolving, including the application of standardized, widely used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee.

COR indicates Class of Recommendation; EO, expert opinion; LD, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; and RCT, randomized controlled trial.

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Fleisher LA, Jneid H, Mack MJ, McLeod CJ, O'Gara PT, Rigolin VH, Sundt TM 3rd, Thompson A. 2017 AHA/ACC Focused Update of the 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 Clinical Practice Guidelines. J Am Coll Cardiol. 2017 Jul 11;70(2):252-289.

"Surgery of the heart has probably reached the limits set by nature to all surgery; no new method and no new discovery can overcome the natural difficulties that attend a wound of the heart."

–STEPHEN PAGET, 1896

(recommendation class III, level of evidence C!!!)

STEPHEN PAGET, M.A., F.R.C.S.
(*Founder of the Research Defence Society*).

•Surgical management of valvular heart disease. Can JCan J Cardiol Vol 20 Suppl E October 2004

ΕΝΔΕΙΞΕΙΣ ΓΙΑ ΧΕΙΡΟΥΡΓΙΚΗ ΑΝΤΙΚΑΤΑΣΤΑΣΗ ΤΗΣ ΑΟΡΤΙΚΗΣ ΒΑΛΒΙΔΑΣ

I. Στένωση αορτικής βαλβίδας
II. Ανεπάρκεια αορτικής βαλβίδας
III. Συνδυασμός αορτικής βαλβιδοπάθειας με άλλες παθήσεις

ΑΠΟ ΤΙ ΚΑΘΟΡΙΖΕΤΑΙ ΑΝ ΠΡΕΠΕΙ ΝΑ ΧΕΙΡΟΥΡΓΗΘΕΙ ΜΙΑ ΣΤΕΝΩΣΗ ΑΟΡΤΙΚΗΣ ΒΑΛΒΙΔΑΣ (AS)

- Βαρύτητα της AS
- Συμπτώματα
- Κλάσμα εξώθησης
- Απάντηση στην άσκηση/ dobutamine stress test
- Συστηματική/ πνευμονική υπέρταση
- Άλλη αορτική ή καρδιακή επέμβαση

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Guyton RA, O'Gara PT, Ruiz CE, Skubas NJ, Sorajja P, Sundt TM 3rd, Thomas JD; American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary. J Am Coll Cardiol. 2014 Jun 10;63(22):2438-88.

ΕΚΤΙΜΗΣΗ ΣΟΒΑΡΟΤΗΤΑΣ AS

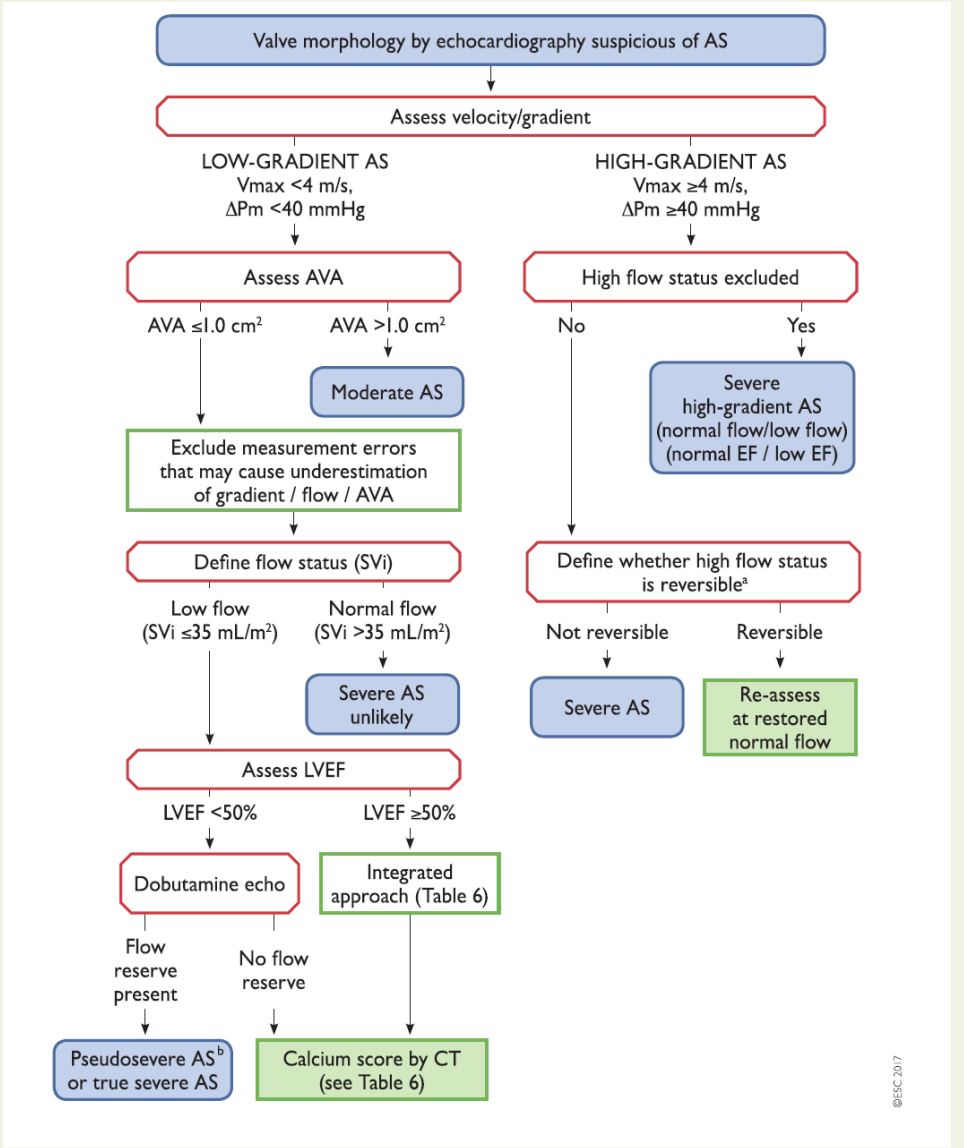

Figure 2 Stepwise integrated approach for the assessment of aortic stenosis severity (modified from Baumgartner *et al*[4]). [a]High flow may be reversible in settings such as anaemia, hyperthyroidism, arteriovenous shunts. [b]Pseudosevere AS is defined by an increase to an AVA >1.0cm² with flow normalization.
ΔPm = mean transvalvular pressure gradient; AS = aortic stenosis; AVA = aortic valve area; CT = computed tomography; EF = ejection fraction; LVEF = left ventricular ejection fraction; SVi = stroke volume index; Vmax = peak transvalvular velocity.

•Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, Iung B, Lancellotti P, Lansac E, Rodriguez Muñoz D, Rosenhek R, Sjögren J, Tornos Mas P, Vahanian A, Walther T, Wendler O, Windecker S, Zamorano JL; ESC Scientific Document Group. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2017 Sep 21;38(36):2739-2791.

ΕΚΤΙΜΗΣΗ ΣΟΒΑΡΟΤΗΤΑΣ AS

Table 6 **Criteria that increase the likelihood of severe aortic stenosis in patients with AVA <1.0 cm^2 and mean gradient <40 mmHg in the presence of preserved ejection fraction (modified from Baumgartner *et al.*[4])**

Criteria	
Clinical criteria	• Typical symptoms without other explanation • Elderly patient (>70 years)
Qualitative imaging data	• LV hypertrophy (additional history of hypertension to be considered) • Reduced LV longitudinal function without other explanation
Quantitative imaging data	• Mean gradient 30–40 mmHg[a]
	• AVA ≤0.8 cm^2
	• Low flow (SVi <35 mL/m^2) confirmed by techniques other than standard Doppler technique (LVOT measurement by 3D TOE or MSCT; CMR, invasive data)
	• Calcium score by MSCT[b] Severe aortic stenosis very likely: men ≥3000; women ≥1600 Severe aortic stenosis likely: men ≥2000; women ≥1200 Severe aortic stenosis unlikely: men <1600; women <800

3D = three-dimensional; AVA = aortic valve area; CMR = cardiovascular magnetic resonance; LV = left ventricular; LVOT = left ventricular outflow tract; MSCT = multislice computed tomography; SVi = stroke volume index; TOE = transoesophageal echocardiography.
[a]Haemodynamics measured when the patient is normotensive.
[b]Values are given in arbitrary units using Agatston method for quantification of valve calcification.

•Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, Iung B, Lancellotti P, Lansac E, Rodriguez Muñoz D, Rosenhek R, Sjögren J, Tornos Mas P, Vahanian A, Walther T, Wendler O, Windecker S, Zamorano JL; ESC Scientific Document Group. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2017 Sep 21;38(36):2739-2791.

Table 8. Stages of Valvular AS

Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of AS	• Bicuspid aortic valve (or other congenital valve anomaly) • Aortic valve sclerosis	• Aortic V_{max} <2 m/s	• None	• None
B	Progressive AS	• Mild-to-moderate leaflet calcification of a bicuspid or trileaflet valve with some reduction in systolic motion or • Rheumatic valve changes with commissural fusion	• Mild AS: Aortic V_{max} 2.0–2.9 m/s or mean ΔP <20 mm Hg • Moderate AS: Aortic V_{max} 3.0–3.9 m/s or mean ΔP 20–39 mm Hg	• Early LV diastolic dysfunction may be present • Normal LVEF	• None
C: Asymptomatic severe AS					
C1	Asymptomatic severe AS	• Severe leaflet calcification or congenital stenosis with severely reduced leaflet opening	• Aortic V_{max} ≥4 m/s or mean ΔP ≥40 mm Hg • AVA typically is ≤1.0 cm^2 (or AVAi ≤0.6 cm^2/m^2) • Very severe AS is an aortic V_{max} ≥5 m/s or mean ΔP ≥60 mm Hg	• LV diastolic dysfunction • Mild LV hypertrophy • Normal LVEF	• None: Exercise testing is reasonable to confirm symptom status
C2	Asymptomatic severe AS with LV dysfunction	• Severe leaflet calcification or congenital stenosis with severely reduced leaflet opening	• Aortic V_{max} ≥4 m/s or mean ΔP ≥40 mm Hg • AVA typically ≤1.0 cm^2 (or AVAi ≤0.6 cm^2/m^2)	• LVEF <50%	• None
D: Symptomatic severe AS					
D1	Symptomatic severe high-gradient AS	• Severe leaflet calcification or congenital stenosis with severely reduced leaflet opening	• Aortic V_{max} ≥4 m/s or mean ΔP ≥40 mm Hg • AVA typically ≤1.0 cm^2 (or AVAi ≤0.6 cm^2/m^2) but may be larger with mixed AS/AR	• LV diastolic dysfunction • LV hypertrophy • Pulmonary hypertension may be present	• Exertional dyspnea or decreased exercise tolerance • Exertional angina • Exertional syncope or presyncope
D2	Symptomatic severe low-flow/low-gradient AS with reduced LVEF	• Severe leaflet calcification with severely reduced leaflet motion	• AVA ≤1.0 cm^2 with resting aortic V_{max} <4 m/s or mean ΔP <40 mm Hg • Dobutamine stress echocardiography shows AVA ≤1.0 cm^2 with V_{max} ≥4 m/s at any flow rate	• LV diastolic dysfunction • LV hypertrophy • LVEF <50%	• HF • Angina • Syncope or presyncope
D3	Symptomatic severe low-gradient AS with normal LVEF or paradoxical low-flow severe AS	• Severe leaflet calcification with severely reduced leaflet motion	• AVA ≤1.0 cm^2 with aortic V_{max} <4 m/s or mean ΔP <40 mm Hg • Indexed AVA ≤0.6 cm^2/m^2 and • Stroke volume index <35 mL/m^2 • Measured when patient is normotensive (systolic BP <140 mm Hg)	• Increased LV relative wall thickness • Small LV chamber with low stroke volume • Restrictive diastolic filling • LVEF ≥50%	• HF • Angina • Syncope or presyncope

AR indicates aortic regurgitation; AS, aortic stenosis; AVA, aortic valve area; AVAi, aortic valve area indexed to body surface area; BP, blood pressure; HF, heart failure; LV, left ventricular; LVEF, left ventricular ejection fraction; ΔP, pressure gradient; and V_{max}, maximum aortic velocity.

Aortic valve area (AVA) classification

	AVA	Indexed AVA
Mild	>1.5 cm^2	>0.9 cm^2/m^2
Moderate	1.0 to 1.5 cm^2	0.6 to 0.9 cm^2/m^2
Severe	<1.0 cm^2	<0.6 cm^2/m^2

•Surgical management of valvular heart disease. Can JCan J Cardiol Vol 20 Suppl E October 2004

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Guyton RA, O'Gara PT, Ruiz CE, Skubas NJ, Sorajja P, Sundt TM 3rd, Thomas JD; American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary. J Am Coll Cardiol. 2014 Jun 10;63(22):2438-88.

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Recommendations for aortic valve replacement in aortic stenosis (AS)

Indication	Class	
1. Symptomatic patients with severe AS	I	B
2. Patients with severe AS undergoing coronary artery bypass surgery	I	B
3. Patients with severe AS undergoing surgery on the aorta or other heart valves	I	B
4. Patients with moderate AS undergoing coronary artery bypass surgery or surgery on the aorta or other heart valves	IIa	C
5. Asymptomatic patients with severe AS and:		
Left ventricular systolic dysfunction	IIa	C
Abnormal response to exercise (eg, hypotension)	IIa	C
Ventricular tachycardia	IIb	C
6. Patients with mild AS undergoing coronary artery bypass surgery	IIb	C
Contraindication	**Class**	
7. Asymptomatic patients with severe AS and:		
Marked or excessive left ventricular hypertrophy (≥15 mm)	III	C
Valve area <0.6 cm^2	III	C
8. Prevention of sudden death in asymptomatic patients with none of the findings listed under indication 7	III	C

Adopted and modified from American College of Cardiology and American Heart Association Guidelines (29)

•Surgical management of valvular heart disease. Can JCan J Cardiol Vol 20 Suppl E October 2004

Recommendations	COR	LOE
AVR is recommended for symptomatic patients with severe high-gradient AS who have symptoms by history or on exercise testing (stage D1)	I	B
AVR is recommended for asymptomatic patients with severe AS (stage C2) and LVEF <50%	I	B
AVR is indicated for patients with severe AS (stage C or D) when undergoing other cardiac surgery	I	B
AVR is reasonable for asymptomatic patients with very severe AS (stage C1, aortic velocity ≥5.0 m/s) and low surgical risk	IIa	B
AVR is reasonable in asymptomatic patients (stage C1) with severe AS and decreased exercise tolerance or an exercise fall in BP	IIa	B
AVR is reasonable in symptomatic patients with low-flow/low-gradient severe AS with reduced LVEF (stage D2) with a low-dose dobutamine stress study that shows an aortic velocity ≥4.0 m/s (or mean pressure gradient ≥40 mm Hg) with a valve area ≤1.0 cm^2 at any dobutamine dose	IIa	B
AVR is reasonable in symptomatic patients who have low-flow/low-gradient severe AS (stage D3) who are normotensive and have an LVEF ≥50% if clinical, hemodynamic, and anatomic data support valve obstruction as the most likely cause of symptoms	IIa	C
AVR is reasonable for patients with moderate AS (stage B) (aortic velocity 3.0–3.9 m/s) who are undergoing other cardiac surgery	IIa	C
AVR may be considered for asymptomatic patients with severe AS (stage C1) and rapid disease progression and low surgical risk	IIb	C

Intervention is indicated in symptomatic patients with severe, high-gradient aortic stenosis (mean gradient ≥40 mmHg or peak velocity ≥4.0 m/s).[91–93]	I	B
Intervention is indicated in symptomatic patients with severe low-flow, low-gradient (<40 mmHg) aortic stenosis with reduced ejection fraction and evidence of flow (contractile) reserve excluding pseudosevere aortic stenosis.	I	C
Intervention should be considered in symptomatic patients with low-flow, low-gradient (<40 mmHg) aortic stenosis with normal ejection fraction after careful confirmation of severe aortic stenosis[c] (see *Figure 2* and *Table 6*).	IIa	C
Intervention should be considered in symptomatic patients with low-flow, low-gradient aortic stenosis and reduced ejection fraction without flow (contractile) reserve, particularly when CT calcium scoring confirms severe aortic stenosis.	IIa	C
Intervention should not be performed in patients with severe comorbidities when the intervention is unlikely to improve quality of life or survival.	III	C
SAVR is indicated in asymptomatic patients with severe aortic stenosis and systolic LV dysfunction (LVEF <50%) not due to another cause.	I	C
SAVR is indicated in asymptomatic patients with severe aortic stenosis and an abnormal exercise test showing symptoms on exercise clearly related to aortic stenosis.	I	C
SAVR should be considered in asymptomatic patients with severe aortic stenosis and an abnormal exercise test showing a decrease in blood pressure below baseline.	IIa	C
SAVR should be considered in asymptomatic patients with normal ejection fraction and none of the above-mentioned exercise test abnormalities if the surgical risk is low and one of the following findings is present: • Very severe aortic stenosis defined by a V_{max} >5.5 m/s • Severe valve calcification and a rate of V_{max} progression ≥0.3 m/s/year • Markedly elevated BNP levels (>threefold age- and sex-corrected normal range) confirmed by repeated measurements without other explanations • Severe pulmonary hypertension (systolic pulmonary artery pressure at rest >60 mmHg confirmed by invasive measurement) without other explanation.	IIa	C
SAVR is indicated in patients with severe aortic stenosis undergoing CABG or surgery of the ascending aorta or of another valve.	I	C
SAVR should be considered in patients with moderate aortic stenosis[e] undergoing CABG or surgery of the ascending aorta or of another valve after Heart Team decision.	IIa	C

SAVR OR TAVR? (ACC/AHA)

Table 10. Summary of Recommendations for AS: Choice of Surgical or Transcatheter Intervention

Recommendations	COR	LOE	References
Surgical AVR is recommended in patients who meet an indication for AVR (Section 3.2.3) with low or intermediate surgical risk	I	A	(74,148)
For patients in whom TAVR or high-risk surgical AVR is being considered, members of a Heart Valve Team should collaborate to provide optimal patient care	I	C	N/A
TAVR is recommended in patients who meet an indication for AVR for AS who have a prohibitive surgical risk and a predicted post-TAVR survival >12 mo	I	B	(169,170)
TAVR is a reasonable alternative to surgical AVR in patients who meet an indication for AVR (Section 3.2.3) and who have high surgical risk (Section 2.5)	IIa	B	(171,172)
Percutaneous aortic balloon dilation may be considered as a bridge to surgical or transcatheter AVR in severely symptomatic patients with severe AS	IIb	C	N/A
TAVR is not recommended in patients in whom existing comorbidities would preclude the expected benefit from correction of AS	III: No Benefit	B	(169)

AS indicates aortic stenosis; AVR, aortic valve replacement; COR, Class of Recommendation; LOE, Level of Evidence; N/A, not applicable; and TAVR, transcatheter aortic valve replacement.

I B-NR
See Online Data Supplements 5 and 9 (Updated From 2014 VHD)

Surgical AR is recommended for symptomatic patients with severe AS (Stage D) and asymptomatic patients with severe AS (Stage C) who meet an indication for AVR when surgical risk is low or intermediate (42,43).

I A
See Online Data Supplement 9 (Updated From 2014 VHD Guideline)

Surgical AVR or TAVR is recommended for symptomatic patients with severe AS (Stage D) and high risk for surgical AVR, depending on patient-specific procedural risks, values, and preferences (49–51).

I A
See Online Data Supplements 5 and 9 (Updated From 2014 VHD Guideline)

TAVR is recommended for symptomatic patients with severe AS (Stage D) and a prohibitive risk for surgical AVR who have a predicted post-TAVR survival greater than 12 months (58–61).

IIa B-R
See Online Data Supplements 5 and 9 (Updated From 2014 VHD Guideline)

TAVR is a reasonable alternative to surgical AVR for symptomatic patients with severe AS (Stage D) and an intermediate surgical risk, depending on patient-specific procedural risks, values, and preferences (62–65).

IIa B-NR
See Online Supplement 9.

For severely symptomatic patients with bioprosthetic aortic valve stenosis judged by the heart team to be at high or prohibitive risk of reoperation, and in whom improvement in hemodynamics is anticipated, a transcatheter valve-in-valve procedure is reasonable (154,247,248).

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Fleisher LA, Jneid H, Mack MJ, McLeod CJ, O'Gara PT, Rigolin VH, Sundt TM 3rd, Thompson A. 2017 AHA/ACC Focused Update of the 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 Clinical Practice Guidelines. J Am Coll Cardiol. 2017 Jul 11;70(2):252-289.
•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Guyton RA, O'Gara PT, Ruiz CE, Skubas NJ, Sorajja P, Sundt TM 3rd, Thomas JD; American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary. J Am Coll Cardiol. 2014 Jun 10;63(22):2438-88.

SAVR OR TAVR (ESC/EACTS)

B) Choice of intervention in symptomatic aortic stenosis		
Aortic valve interventions should only be performed in centres with both departments of cardiology and cardiac surgery on site and with structured collaboration between the two, including a Heart Team (heart valve centres).	I	C
The choice for intervention must be based on careful individual evaluation of technical suitability and weighing of risks and benefits of each modality (aspects to be considered are listed in *Table 7*). In addition, the local expertise and outcomes data for the given intervention must be taken into account.	I	C
SAVR is recommended in patients at low surgical risk (STS or EuroSCORE II < 4% or logistic EuroSCORE I < 10%[d] and no other risk factors not included in these scores, such as frailty, porcelain aorta, sequelae of chest radiation).[93]	I	B
TAVI is recommended in patients who are not suitable for SAVR as assessed by the Heart Team.[91,94]	I	B
In patients who are at increased surgical risk (STS or EuroSCORE II ≥ 4% or logistic EuroSCORE I ≥ 10%[d] or other risk factors not included in these scores such as frailty, porcelain aorta, sequelae of chest radiation), the decision between SAVR and TAVI should be made by the Heart Team according to the individual patient characteristics (see *Table 7*), with TAVI being favoured in elderly patients suitable for transfemoral access.[91,94–102]	I	B
Balloon aortic valvotomy may be considered as a bridge to SAVR or TAVI in haemodynamically unstable patients or in patients with symptomatic severe aortic stenosis who require urgent major non-cardiac surgery.	IIb	C
Balloon aortic valvotomy may be considered as a diagnostic means in patients with severe aortic stenosis or other potential causes for symptoms (i.e. lung disease) and in patients with severe myocardial dysfunction, pre-renal insufficiency or other organ dysfunction that may be reversible with balloon aortic valvotomy when performed in centres that can escalate to TAVI.	IIb	C

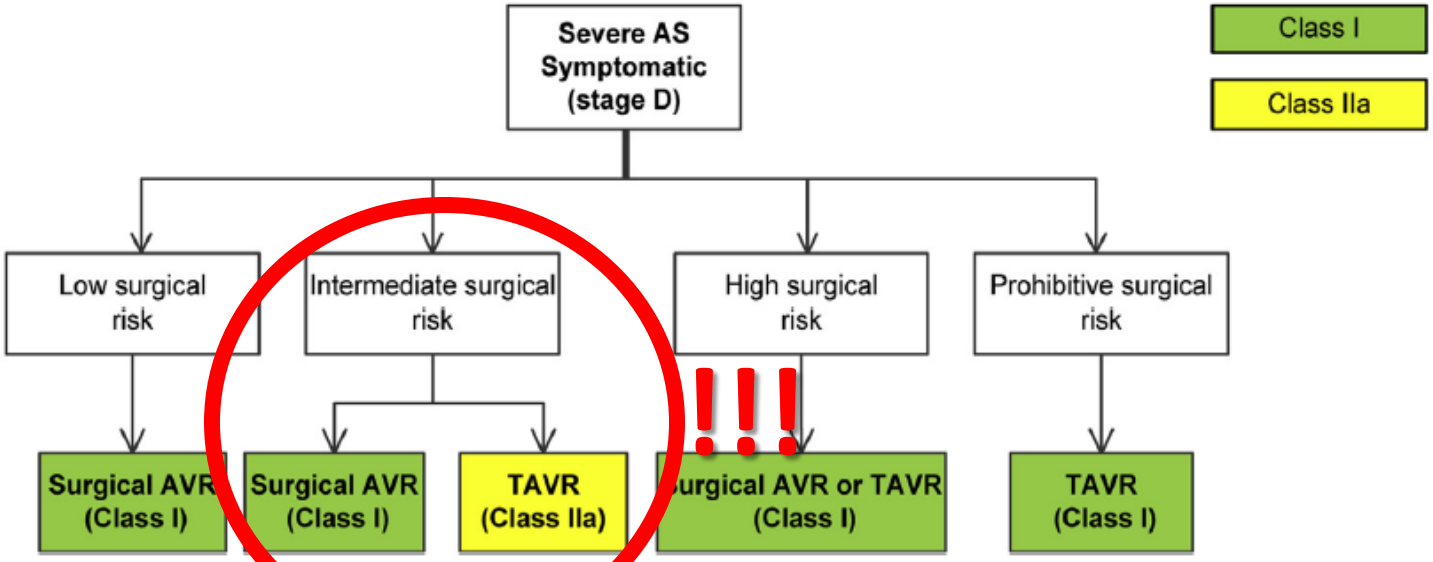
BNP = B-type natriuretic peptide; CABG, coronary artery bypass grafting; CT = computed tomography; EuroSCORE = European System for Cardiac Operative Risk Evaluation; LV = left ventricular; LVEF = left ventricular ejection fraction; SAVR = surgical aortic valve replacement; STS = Society of Thoracic Surgeons; TAVI = transcatheter aortic valve implantation; V_{max} = peak transvalvular velocity.

[d]STS score (calculator: http://riskcalc.sts.org/stswebriskcalc/#/calculate); EuroSCORE II (calculator: http://www.euroscore.org/calc.html); logistic EuroSCORE I (calculator: http://www.euroscore.org/calcge.html); scores have major limitations for practical use in this setting by insufficiently considering disease severity and not including major risk factors such as frailty, porcelain aorta, chest radiation, etc.[103] EuroSCORE I markedly overestimates 30-day mortality and should therefore be replaced by the better-performing EuroSCORE II with this regard; it is nevertheless provided here for comparison, as it has been used in many TAVI studies/registries and may still be useful to identify the subgroups of patients for decision between intervention modalities and to predict 1-year mortality.

•Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, Iung B, Lancellotti P, Lansac E, Rodriguez Muñoz D, Rosenhek R, Sjögren J, Tornos Mas P, Vahanian A, Walther T, Wendler O, Windecker S, Zamorano JL; ESC Scientific Document Group. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2017 Sep 21;38(36):2739-2791.

SAVR OR TAVR

FIGURE 1 Choice of TAVR Versus Surgical AVR in the Patient With Severe Symptomatic AS



AS indicates aortic stenosis; AVR, aortic valve replacement; and TAVR, transcatheter aortic valve replacement.

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Fleisher LA, Jneid H, Mack MJ, McLeod CJ, O'Gara PT, Rigolin VH, Sundt TM 3rd, Thompson A. 2017 AHA/ACC Focused Update of the 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 Clinical Practice Guidelines. J Am Coll Cardiol. 2017 Jul 11;70(2):252-289.

SAVR OR TAVR

	Favours TAVI	Favours SAVR
Clinical characteristics		
STS/EuroSCORE II <4% (logistic EuroSCORE I <10%)[a]		+
STS/EuroSCORE II ≥4% (logistic EuroSCORE I ≥10%)[a]	+	
Presence of severe comorbidity (not adequately reflected by scores)	+	
Age <75 years		+
Age ≥75 years	+	
Previous cardiac surgery	+	
Frailty[b]	+	
Restricted mobility and conditions that may affect the rehabilitation process after the procedure	+	
Suspicion of endocarditis		+
Anatomical and technical aspects		
Favourable access for transfemoral TAVI	+	
Unfavourable access (any) for TAVI		+
Sequelae of chest radiation	+	
Porcelain aorta	+	
Presence of intact coronary bypass grafts at risk when sternotomy is performed	+	
Expected patient–prosthesis mismatch	+	
Severe chest deformation or scoliosis	+	
Short distance between coronary ostia and aortic valve annulus		+
Size of aortic valve annulus out of range for TAVI		+
Aortic root morphology unfavourable for TAVI		+
Valve morphology (bicuspid, degree of calcification, calcification pattern) unfavourable for TAVI		+
Presence of thrombi in aorta or LV		+

Cardiac conditions in addition to aortic stenosis that require consideration for concomitant intervention		
Severe CAD requiring revascularization by CABG		+
Severe primary mitral valve disease, which could be treated surgically		+
Severe tricuspid valve disease		+
Aneurysm of the ascending aorta		+
Septal hypertrophy requiring myectomy		+

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CABG = coronary artery bypass grafting; CAD = coronary artery disease; EuroSCORE = European System for Cardiac Operative Risk Evaluation; LV = left ventricle; SAVR = surgical aortic valve replacement; STS = Society of Thoracic Surgeons; TAVI = transcatheter aortic valve implantation.

[a]STS score (calculator: http://riskcalc.sts.org/stswebriskcalc/#/calculate); EuroSCORE II (calculator: http://www.euroscore.org/calc.html); logistic EuroSCORE I (calculator: http://www.euroscore.org/calcge.html); scores have major limitations for practical use in this setting by insufficiently considering disease severity and not including major risk factors such as frailty, porcelain aorta, chest radiation etc.[103] EuroSCORE I markedly overestimates 30-day mortality and should therefore be replaced by the better performing EuroSCORE II with this regard; it is nevertheless provided here for comparison as it has been used in many TAVI studies/registries and may still be useful to identify the subgroups of patients for decision between intervention modalities and to predict 1-year mortality.

[b]See section 3.3, general comments, for frailty assessment.

•Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, Iung B, Lancellotti P, Lansac E, Rodriguez Muñoz D, Rosenhek R, Sjögren J, Tornos Mas P, Vahanian A, Walther T, Wendler O, Windecker S, Zamorano JL; ESC Scientific Document Group. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2017 Sep 21;38(36):2739-2791.

ΑΠΟ ΤΙ ΚΑΘΟΡΙΖΕΤΑΙ ΑΝ ΠΡΕΠΕΙ ΝΑ ΧΕΙΡΟΥΡΓΗΘΕΙ ΜΙΑ ΑΝΕΠΑΡΚΕΙΑ ΑΟΡΤΙΚΗΣ ΒΑΛΒΙΔΑΣ (AR)

- Οξεία ή χρόνια
- Βαρύτητα ανεπάρκειας αορτικής βαλβίδας
- Συμπτώματα (NYHA functional class, CCS angina class)
- Κλάσμα εξώθησης
- Διάταση αριστερής κοιλίας
- Άλλη αορτική ή καρδιακή επέμβαση

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Fleisher LA, Jneid H, Mack MJ, McLeod CJ, O'Gara PT, Rigolin VH, Sundt TM 3rd, Thompson A. 2017 AHA/ACC Focused Update of the 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 Clinical Practice Guidelines. J Am Coll Cardiol. 2017 Jul 11;70(2):252-289.

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•Surgical management of valvular heart disease. Can JCan J Cardiol Vol 20 Suppl E October 2004

ΕΚΤΙΜΗΣΗ ΒΑΡΥΤΗΤΑΣ ΤΗΣ ΑΝΕΠΑΡΚΕΙΑΣ ΤΗΣ ΑΟΡΤΙΚΗΣ ΒΑΛΒΙΔΑΣ

Grading of aortic regurgitation using colour flow Doppler aortic regurgitation jet diameter versus left ventricular outflow tract (LVOT)

Grade	% aortic regurgitation/LVOT ratio
I	<25%
II	25% to 46%
III	47% to 64%
IV	≥65%

•Surgical management of valvular heart disease. Can JCan J Cardiol Vol 20 Suppl E October 2004

Table 11. Stages of Chronic AR

Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of AR	• Bicuspid aortic valve (or other congenital valve anomaly) • Aortic valve sclerosis • Diseases of the aortic sinuses or ascending aorta • History of rheumatic fever or known rheumatic heart disease • IE	• AR severity: none or trace	• None	• None
B	Progressive AR	• Mild-to-moderate calcification of a trileaflet valve bicuspid aortic valve (or other congenital valve anomaly) • Dilated aortic sinuses • Rheumatic valve changes • Previous IE	• **Mild AR:** ○ Jet width <25% of LVOT; ○ Vena contracta <0.3 cm; ○ RVol <30 mL/beat; ○ RF <30%; ○ ERO <0.10 cm^2; ○ Angiography grade 1+ • **Moderate AR:** ○ Jet width 25%–64% of LVOT; ○ Vena contracta 0.3–0.6 cm; ○ RVol 30–59 mL/beat; ○ RF 30%–49%; ○ ERO 0.10–0.29 cm^2; ○ Angiography grade 2+	• Normal LV systolic function • Normal LV volume or mild LV dilation	• None
C	Asymptomatic severe AR	• Calcific aortic valve disease • Bicuspid valve (or other congenital abnormality) • Dilated aortic sinuses or ascending aorta • Rheumatic valve changes • IE with abnormal leaflet closure or perforation	• **Severe AR:** ○ Jet width ≥65% of LVOT; ○ Vena contracta >0.6 cm; ○ Holodiastolic flow reversal in the proximal abdominal aorta ○ RVol ≥60 mL/beat; ○ RF ≥50%; ○ ERO ≥0.3 cm^2; ○ Angiography grade 3+ to 4+; ○ In addition, diagnosis of chronic severe AR requires evidence of LV dilation	**C1:** Normal LVEF (≥50%) and mild-to-moderate LV dilation (LVESD ≤50 mm) **C2:** Abnormal LV systolic function with depressed LVEF (<50%) or severe LV dilatation (LVESD >50 mm or indexed LVESD >25 mm/m^2)	• None; exercise testing is reasonable to confirm symptom status
D	Symptomatic severe AR	• Calcific valve disease • Bicuspid valve (or other congenital abnormality) • Dilated aortic sinuses or ascending aorta • Rheumatic valve changes • Previous IE with abnormal leaflet closure or perforation	• **Severe AR:** ○ Doppler jet width ≥65% of LVOT; ○ Vena contracta >0.6 cm, ○ Holodiastolic flow reversal in the proximal abdominal aorta, ○ RVol ≥60 mL/beat; ○ RF ≥50%; ○ ERO ≥0.3 cm^2; ○ Angiography grade 3+ to 4+; ○ In addition, diagnosis of chronic severe AR requires evidence of LV dilation	• Symptomatic severe AR may occur with normal systolic function (LVEF ≥50%), mild-to-moderate LV dysfunction (LVEF 40%–50%), or severe LV dysfunction (LVEF <40%); • Moderate-to-severe LV dilation is present.	• Exertional dyspnea or angina or more severe HF symptoms

AR indicates aortic regurgitation; ERO, effective regurgitant orifice; HF, heart failure; IE, infective endocarditis; LV, left ventricular; LVEF, left ventricular ejection fraction; LVESD, left ventricular end-systolic dimension; LVOT, left ventricular outflow tract; RF, regurgitant fraction; and RVol, regurgitant volume.

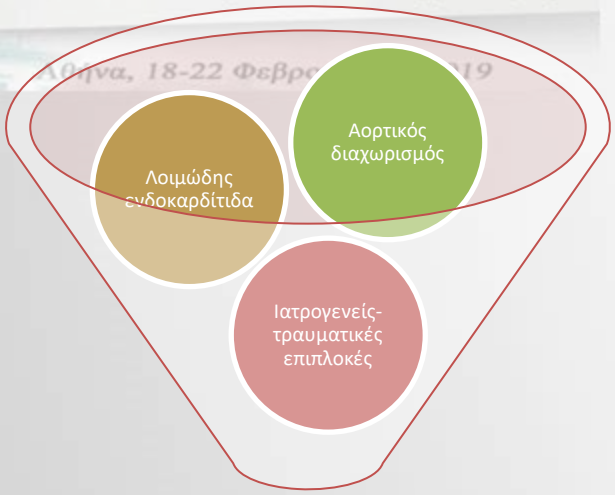
•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Guyton RA, O'Gara PT, Ruiz CE, Skubas NJ, Sorajja P, Sundt TM 3rd, Thomas JD; American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary. J Am Coll Cardiol. 2014 Jun 10;63(22):2438-88.

ΗΧΩΚΑΡΔΙΟΓΡΑΦΙΚΑ ΚΡΙΤΗΡΙΑ ΣΟΒΑΡΗΣ AR

	Aortic regurgitation
Qualitative	
Valve morphology	Abnormal/flail/large coaptation defect
Colour flow regurgitant jet	Large in central jets, variable in eccentric jets[a]
CW signal of regurgitant jet	Dense
Other	Holodiastolic flow reversal in descending aorta (EDV >20 cm/s)
Semiquantitative	
Vena contracta width (mm)	>6
Upstream vein flow[c]	–
Inflow	–
Other	Pressure half-time <200 ms[f]
Quantitative	
EROA (mm^2)	≥30
Regurgitant volume (mL/beat)	≥60
+ enlargement of cardiac chambers/vessels	LV

•Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, Iung B, Lancellotti P, Lansac E, Rodriguez Muñoz D, Rosenhek R, Sjögren J, Tornos Mas P, Vahanian A, Walther T, Wendler O, Windecker S, Zamorano JL; ESC Scientific Document Group. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2017 Sep 21;38(36):2739-2791.

ΟΞΕΙΑ AR



Οξεία AR

Συννοσηρότητα

Χειρουργική αντικατάσταση αορτικής βαλβίδας

Σοβαρό εμβολικό αγγειακό εγκεφαλικό επεισόδιο

Συννοσηρότητα με απομακρυσμένη ανάρρωση

•Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, Iung B, Lancellotti P, Lansac E, Rodriguez Muñoz D, Rosenhek R, Sjögren J, Tornos Mas P, Vahanian A, Walther T, Wendler O, Windecker S, Zamorano JL; ESC Scientific Document Group. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2017 Sep 21;38(36):2739-2791.
•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Guyton RA, O'Gara PT, Ruiz CE, Skubas NJ, Sorajja P, Sundt TM 3rd, Thomas JD; American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary. J Am Coll Cardiol. 2014 Jun 10;63(22):2438-88.

Recommendations for aortic valve replacement in chronic severe aortic regurgitation

Indication	Class	
1. Patients with New York Heart Association (NYHA) functional class III or IV symptoms and preserved left ventricular (LV) systolic function, defined as normal ejection fraction at rest (ejection fraction ≥0.50)	I	B
2. Patients with NYHA functional class II symptoms and preserved LV systolic function (ejection fraction ≥0.50 at rest) but with progressive LV dilation or declining ejection fraction at rest on serial studies or declining effort tolerance on exercise testing	I	B
3. Patients with Canadian Cardiovascular Society class II or greater angina with or without coronary artery disease	I	C
4. Asymptomatic or symptomatic patients with mild to moderate LV dysfunction at rest (ejection fraction 0.25 to 0.49)	I	C
5. Patients undergoing coronary artery bypass surgery or surgery on the aorta or other heart valves	I	C
6. Patients with NYHA functional class II symptoms and preserved LV systolic function (ejection fraction ≥0.50 at rest) with stable LV size and systolic function on serial studies and stable exercise tolerance	IIa	C
7. Asymptomatic patients with normal LV systolic function (ejection fraction ≥0.50) but with severe LV dilation (end-diastolic dimension >75 mm or end-systolic dimension >55 mm)*	IIa	C
8. Patients with severe LV dysfunction (ejection fraction <0.25)	IIb	C
9. Asymptomatic patients with normal systolic function at rest (ejection fraction >0.50) and progressive LV dilation when the degree of dilation is moderately severe (end-diastolic dimension 70 to 75 mm, end-systolic dimension 50 to 55 mm)	IIb	C
10. Asymptomatic patients with normal systolic function at rest (ejection fraction >0.50) but with decline in ejection fraction during exercise radionuclide angiography	IIb	C
11. Asymptomatic patients with normal systolic function at rest (ejection fraction >0.50) but with decline in ejection fraction during stress echocardiography	IIb	C
Contraindication		
12. Asymptomatic patients with normal systolic function at rest (ejection fraction >0.50) and LV dilation when degree of dilation is not severe (end-diastolic dimension <70 mm, end-systolic dimension <50 mm)	III	C

Consider lower threshold values for patients of small stature of either sex. Clinical judgement is required. Adopted and modified from American College of Cardiology and American Heart Association Guidelines (29)

•Surgical management of valvular heart disease. Can JCan J Cardiol Vol 20 Suppl E October 2004

Table 12. Summary of Recommendations for AR Intervention

Recommendations	COR	LOE
AVR is indicated for symptomatic patients with severe AR regardless of LV systolic function (stage D)	I	B
AVR is indicated for asymptomatic patients with chronic severe AR and LV systolic dysfunction (LVEF <50%) (stage C2)	I	B
AVR is indicated for patients with severe AR (stage C or D) while undergoing cardiac surgery for other indications	I	C
AVR is reasonable for asymptomatic patients with severe AR with normal LV systolic function (LVEF ≥50%) but with severe LV dilation (LVESD >50 mm, stage C2)	IIa	B
AVR is reasonable in patients with moderate AR (stage B) who are undergoing other cardiac surgery	IIa	C
AVR may be considered for asymptomatic patients with severe AR and normal LV systolic function (LVEF ≥50%, stage C1) but with progressive severe LV dilation (LVEDD >65 mm) if surgical risk is low*	IIb	C

Indications for surgery	Class[a]	Level[b]
A. Severe aortic regurgitation		
Surgery is indicated in symptomatic patients.[57,58,66,67]	I	B
Surgery is indicated in asymptomatic patients with resting LVEF ≤50%.[57,58]	I	B
Surgery is indicated in patients undergoing CABG or surgery of the ascending aorta or of another valve.	I	C
Heart Team discussion is recommended in selected patients[c] in whom aortic valve repair may be a feasible alternative to valve replacement.	I	C
Surgery should be considered in asymptomatic patients with resting ejection fraction >50% with severe LV dilatation: LVEDD >70 mm or LVESD >50 mm (or LVESD >25 mm/m^2 BSA in patients with small body size).[58,66]	IIa	B

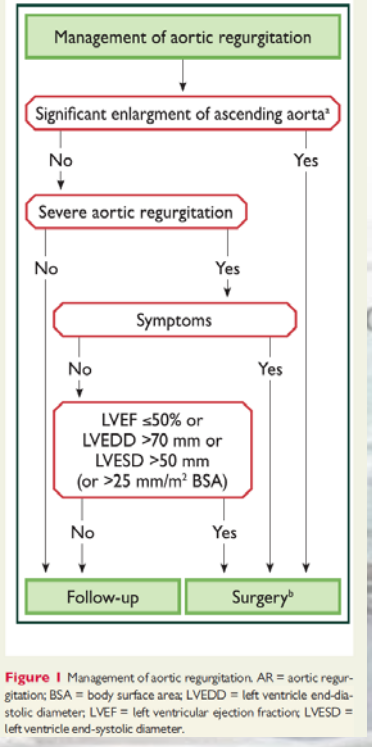


Figure 1 Management of aortic regurgitation. AR = aortic regurgitation; BSA = body surface area; LVEDD = left ventricle end-diastolic diameter; LVEF = left ventricular ejection fraction; LVESD = left ventricle end-systolic diameter.

ΕΝΩΣΗ ΕΠΙΣΤΗΜΟΝΙΚΟΥ ΠΡΟΣΩΠΙΚΟΥ
ΟΣΟΚΟΜΕΙΟΥ «Ο ΕΥΑΓΓΕΛΙΣΜΟΣ» (Ε.Ε.Π.Ν.Ε.)

AMERICAN COLLEGE of CARDIOLOGY

American Heart Association.

ESC European Society of Cardiology

EACTS European Association For Cardio-Thoracic Surgery

ΣΥΝΔΥΑΣΜΟΣ ΑΟΡΤΙΚΗΣ ΒΑΛΒΙΔΟΠΑΘΕΙΑΣ ΜΕ ΑΛΛΕΣ ΠΑΘΗΣΕΙΣ

ΠΟΛΛΑΠΛΗ ΒΑΛΒΙΔΟΠΑΘΕΙΑ

Μικτή νόσος

- Επικρατούσα οντότητα
- Συμπτώματα

Διαφορετικές βαλβίδες

- Συμπτώματα
- Διάταση ή δυσλειτουργία αριστερής κοιλίας

No evidence-based recommendations

D) Concomitant aortic valve surgery at the time of other cardiac/ascending aorta surgery		
SAVR is indicated in patients with severe aortic stenosis undergoing CABG or surgery of the ascending aorta or of another valve.	I	C
SAVR should be considered in patients with moderate aortic stenosis[e] undergoing CABG or surgery of the ascending aorta or of another valve after Heart Team decision.	IIa	C

BNP = B-type natriuretic peptide; CABG, coronary artery bypass grafting; CT = computed tomography; EuroSCORE = European System for Cardiac Operative Risk Evaluation; LV = left ventricular; LVEF = left ventricular ejection fraction; SAVR = surgical aortic valve replacement; STS = Society of Thoracic Surgeons; TAVI = transcatheter aortic valve implantation; V_{max} = peak transvalvular velocity.

[e]Moderate aortic stenosis is defined as a valve area of 1.0–1.5 cm^2 or a mean aortic gradient of 25–40 mmHg in the presence of normal flow conditions. However, clinical judgement is required.

•Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, Iung B, Lancellotti P, Lansac E, Rodriguez Muñoz D, Rosenhek R, Sjögren J, Tornos Mas P, Vahanian A, Walther T, Wendler O, Windecker S, Zamorano JL; ESC Scientific Document Group. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2017 Sep 21;38(36):2739-2791.
•Surgical management of valvular heart disease. Can JCan J Cardiol Vol 20 Suppl E October 2004

AS & ΣΤΕΦΑΝΙΑΙΑ ΝΟΣΟΣ

Recommendations for aortic valve replacement in patients undergoing coronary artery bypass surgery

Indication	Class	
1. In patients undergoing CABG who have severe AS who meet the criteria for valve replacement	I	B
2. In patients undergoing CABG who have moderate AS (mean gradient 30 to 50 mmHg or Doppler velocity 3 to 4 m/s)	IIa	C
3. In patients undergoing CABG who have mild AS (mean gradient ≤25 mmHg or Doppler velocity ≤3 m/s)	IIb	C

AS Aortic stenosis; CABG Coronary artery bypass grafting

CLASS IIa

1. **CABG or PCI is reasonable in patients undergoing valve repair or replacement with significant CAD (≥70% reduction in luminal diameter in major coronary arteries or ≥50% reduction in luminal diameter in the left main coronary artery). *(Level of Evidence: C)***

Indications for myocardial revascularization		
CABG is recommended in patients with a primary indication for aortic/mitral valve surgery and coronary artery diameter stenosis ≥70%.[e]	I	C
CABG should be considered in patients with a primary indication for aortic/mitral valve surgery and coronary artery diameter stenosis ≥50–70%.	IIa	C
PCI should be considered in patients with a primary indication to undergo TAVI and coronary artery diameter stenosis >70% in proximal segments.	IIa	C

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Guyton RA, O'Gara PT, Ruiz CE, Skubas NJ, Sorajja P, Sundt TM 3rd, Thomas JD; American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary. J Am Coll Cardiol. 2014 Jun 10;63(22):2438-88.

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AS/AR & ΑΝΕΥΡΥΣΜΑΤΙΚΗ ΑΟΡΤΙΚΗ ΝΟΣΟΣ

D) Concomitant aortic valve surgery at the time of other cardiac/ascending aorta surgery		
SAVR is indicated in patients with severe aortic stenosis undergoing CABG or surgery of the ascending aorta or of another valve.	I	C
SAVR should be considered in patients with moderate aortic stenosis[e] undergoing CABG or surgery of the ascending aorta or of another valve after Heart Team decision.	IIa	C

BNP = B-type natriuretic peptide; CABG, coronary artery bypass grafting; CT = computed tomography; EuroSCORE = European System for Cardiac Operative Risk Evaluation; LV = left ventricular; LVEF = left ventricular ejection fraction; SAVR = surgical aortic valve replacement; STS = Society of Thoracic Surgeons; TAVI = transcatheter aortic valve implantation; V_{max} = peak transvalvular velocity.

[e]Moderate aortic stenosis is defined as a valve area of 1.0–1.5 cm^2 or a mean aortic gradient of 25–40 mmHg in the presence of normal flow conditions. However, clinical judgement is required.

B. Aortic root or tubular ascending aortic aneurysm[d] (irrespective of the severity of aortic regurgitation)		
Aortic valve repair, using the reimplantation or remodelling with aortic annuloplasty technique, is recommended in young patients with aortic root dilation and tricuspid aortic valves, when performed by experienced surgeons.	I	C
Surgery is indicated in patients with Marfan syndrome who have aortic root disease with a maximal ascending aortic diameter ≥50 mm.	I	C
Surgery should be considered in patients who have aortic root disease with maximal ascending aortic diameter:	IIa	C
• ≥45 mm in the presence of Marfan syndrome and additional risk factors[e] or patients with a *TGFBR1* or *TGFBR2* mutation (including Loeys–Dietz syndrome).[f]	IIa	C
• ≥50 mm in the presence of a bicuspid valve with additional risk factors[e] or coarctation.	IIa	C
• ≥55 mm for all other patients.	IIa	C
When surgery is primarily indicated for the aortic valve, replacement of the aortic root or tubular ascending aorta should be considered when ≥45 mm, particularly in the presence of a bicuspid valve.[g]	IIa	C

Recommendations

AVR is indicated for patients with severe AS (stage C or D) when undergoing other cardiac surgery

AVR is reasonable for patients with moderate AS (stage B) (aortic velocity 3.0–3.9 m/s) who are undergoing other cardiac surgery

>45mm

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Guyton RA, O'Gara PT, Ruiz CE, Skubas NJ, Sorajja P, Sundt TM 3rd, Thomas JD; American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary. J Am Coll Cardiol. 2014 Jun 10;63(22):2438-88.

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ΑΟΡΤΙΚΗ ΒΑΛΒΙΔΟΠΑΘΕΙΑ & ΕΓΚΥΜΟΣΥΝΗ

Recommendations for valvular intervention before conception

Indication		Class	
2. Severe aortic stenosis and considering pregnancy:			
Symptomatic	Surgical intervention before conception	I	B
Asymptomatic	Individualize therapy according to functional status and surgical intervention. Prophylactic intervention based on risk to benefit ratio	IIa	C

Recommendations for valvular intervention during pregnancy

Indication	Procedure	Class	
2. Symptomatic severe aortic stenosis refractory to medical therapy for pulmonary edema or low output syndrome	Aortic valve replacement once fetal maturity in third trimester with fetal monitoring	I	B
	Percutaneous aortic valvotomy reserve for salvage situations where surgery is not possible	IIb	C

CLASS I

1. Valve intervention is recommended before pregnancy for symptomatic patients with severe AS (aortic velocity ≥4.0 m per second or mean pressure gradient ≥40 mm Hg, stage D). *(Level of Evidence: C)*

CLASS IIa

1. Valve intervention is reasonable before pregnancy for asymptomatic patients with severe AS (aortic velocity ≥4.0 m per second or mean pressure gradient ≥40 mm Hg, stage C). *(Level of Evidence: C)*
4. Valve intervention is reasonable for pregnant patients with severe AS (mean pressure gradient ≥40 mm Hg, stage D) only if there is hemodynamic deterioration or NYHA class III to IV HF symptoms (805,823–828). *(Level of Evidence: B)*

CLASS III: Harm

1. Valve operation should not be performed in pregnant patients with valve stenosis in the absence of severe HF symptoms. *(Level of Evidence: C)*

- Καλύτερα προ εγκυμοσύνης
- AVR μόνο επί βαριάς συμπτωματολογίας
- AR συνήθως καλά ανεκτή

CLASS I

1. Valve repair or replacement is recommended before pregnancy for symptomatic women with severe valve regurgitation (stage D). *(Level of Evidence: C)*

CLASS IIa

1. Valve operation for pregnant patients with severe valve regurgitation is reasonable only if there are refractory NYHA class IV HF symptoms (stage D). *(Level of Evidence: C)*

CLASS III: Harm

1. Valve operations should not be performed in pregnant patients with valve regurgitation in the absence of severe intractable HF symptoms. *(Level of Evidence: C)*

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Guyton RA, O'Gara PT, Ruiz CE, Skubas NJ, Sorajja P, Sundt TM 3rd, Thomas JD; American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary. J Am Coll Cardiol. 2014 Jun 10;63(22):2438-88.

•Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, Iung B, Lancellotti P, Lansac E, Rodriguez Muñoz D, Rosenhek R, Sjögren J, Tornos Mas P, Vahanian A, Walther T, Wendler O, Windecker S, Zamorano JL; ESC Scientific Document Group. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2017 Sep 21;38(36):2739-2791.

•Surgical management of valvular heart disease. Can JCan J Cardiol Vol 20 Suppl E October 2004

ΕΠΑΝΕΠΕΜΒΑΣΗ ΓΙΑ AS/AR

CLASS I

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

CLASS I

1. Surgery is recommended for operable patients with mechanical heart valves with intractable hemolysis or HF due to severe prosthetic or paraprosthetic regurgitation (617,618). *(Level of Evidence: B)*

CLASS IIa

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

IIa | C-LD

TAVI VALVE-IN-VALVE

IIa | B-NR

See Online Supplement 9.

For severely symptomatic patients with bioprosthetic aortic valve stenosis judged by the heart team to be at high or prohibitive risk of reoperation, and in whom improvement in hemodynamics is anticipated, a transcatheter valve-in-valve procedure is reasonable (154,247,248).

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 (620–622). *(Level of Evidence B)*

IIa | B-NR

See Online Data Supplement 9.

For severely symptomatic patients with bioprosthetic aortic valve regurgitation judged by the heart team to be at high or prohibitive risk for surgical therapy, in whom improvement in hemodynamics is anticipated, a transcatheter valve-in-valve procedure is reasonable (154,247,248).

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Fleisher LA, Jneid H, Mack MJ, McLeod CJ, O'Gara PT, Rigolin VH, Sundt TM 3rd, Thompson A. 2017 AHA/ACC Focused Update of the 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 Clinical Practice Guidelines. J Am Coll Cardiol. 2017 Jul 11;70(2):252-289.

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Guyton RA, O'Gara PT, Ruiz CE, Skubas NJ, Sorajja P, Sundt TM 3rd, Thomas JD; American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary. J Am Coll Cardiol. 2014 Jun 10;63(22):2438-88.

ΘΡΟΜΒΩΣΗ ΠΡΟΣΘΕΤΙΚΗΣ ΒΑΛΒΙΔΑΣ

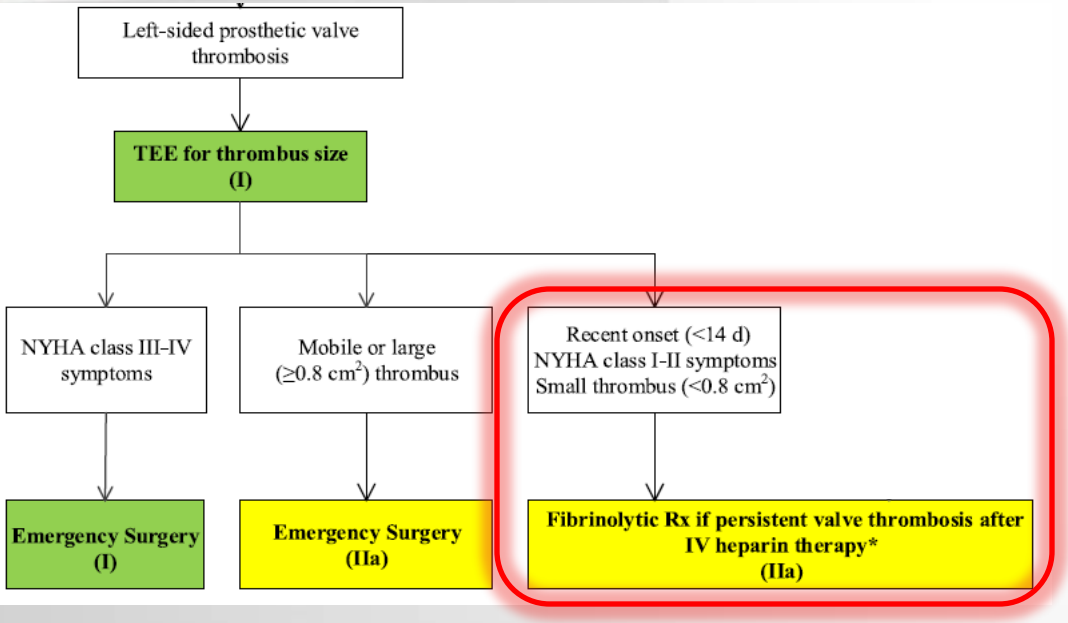

TABLE 4 Fibrinolysis Versus Surgery for Prosthetic Valve Thrombosis

Favor Surgery	Favor Fibrinolysis
Readily available surgical expertise	No surgical expertise available
Low surgical risk	High surgical risk
Contraindication to fibrinolysis	No contraindication to fibrinolysis
Recurrent valve thrombosis	First-time episode of valve thrombosis
NYHA class IV	NYHA class I–III
Large clot (>0.8 cm²)	Small clot (≤0.8 cm²)
Left atrial thrombus	No left atrial thrombus
Concomitant CAD in need of revascularization	No or mild CAD
Other valve disease	No other valve disease
Possible pannus	Thrombus visualized
Patient choice	Patient choice

CAD indicates coronary artery disease; and NYHA, New York Heart Association.

I | B-NR

See Online Data Supplement 7 and 7A.

Urgent initial treatment with either slow-infusion low-dose fibrinolytic therapy or emergency surgery is recommended for patients with a thrombosed left-sided mechanical prosthetic heart valve presenting with symptoms of valve obstruction (224–231).

IIa | C-LD

See Online Data Supplement 8.

In patients with suspected or confirmed bioprosthetic valve thrombosis who are hemodynamically stable and have no contraindications to anticoagulation, initial treatment with a VKA is reasonable (203,242–246).

•Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, Iung B, Lancellotti P, Lansac E, Rodriguez Muñoz D, Rosenhek R, Sjögren J, Tornos Mas P, Vahanian A, Walther T, Wendler O, Windecker S, Zamorano JL; ESC Scientific Document Group. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2017 Sep 21;38(36):2739-2791.

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•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Fleisher LA, Jneid H, Mack MJ, McLeod CJ, O'Gara PT, Rigolin VH, Sundt TM 3rd, Thompson A. 2017 AHA/ACC Focused Update of the 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 Clinical Practice Guidelines. J Am Coll Cardiol. 2017 Jul 11;70(2):252-289.

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ΕΝΔΟΚΑΡΔΙΤΙΔΑ

Recommendations for surgery for native valve endocarditis

Indication	Class	
1. Acute aortic regurgitation or MR with heart failure	I	B
2. Acute aortic regurgitation with tachycardia and early closure of the mitral valve	I	B
3. Fungal endocarditis	I	B
4. Evidence of annular or aortic abscess, sinus or aortic true or false aneurysm	I	B
5. Evidence of valve dysfunction and persistent infection after a prolonged period (7 to 10 days) of appropriate antibiotic therapy, as indicated by presence of fever, leukocytosis and bacteremia, provided there are no noncardiac causes for infection	I	B
6. Recurrent emboli after appropriate antibiotic therapy	IIa	C
7. Infection with Gram-negative organisms or organisms with a poor response to antibiotics in patients with evidence of valve dysfunction	IIa	C
8. Mobile vegetations >10 mm	IIb	C
Contraindication		
9. Early infections of the mitral valve that can likely be repaired	III	C
10. Persistent pyrexia and leukocytosis with negative blood cultures	III	C

Recommendations for surgery for prosthetic valve endocarditis

Indication	Class	
1. Early prosthetic valve endocarditis (first 2 months or less after surgery)	I	B
2. Heart failure with prosthetic valve dysfunction	I	B
3. Fungal endocarditis	I	B
4. Staphylcoccal endocarditis not responding to antibiotic therapy	I	B
5. Evidence of paravalvular leak, annular or aortic abscess, sinus or aortic true or false aneurysm, fistula formation, or new-onset conduction disturbances	I	B
6. Infection with Gram-negative organisms or organisms with a poor response to antibiotics	I	B
7. Persistent bacteremia after a prolonged course (7 to 10 days) of appropriate antibiotic therapy without noncardiac causes for bacteremia	IIa	C
8. Recurrent peripheral embolus despite therapy	IIa	C
9. Vegetation of any size on or near the prosthesis	IIb	C

•Surgical management of valvular heart disease. Can JCan J Cardiol Vol 20 Suppl E October 2004

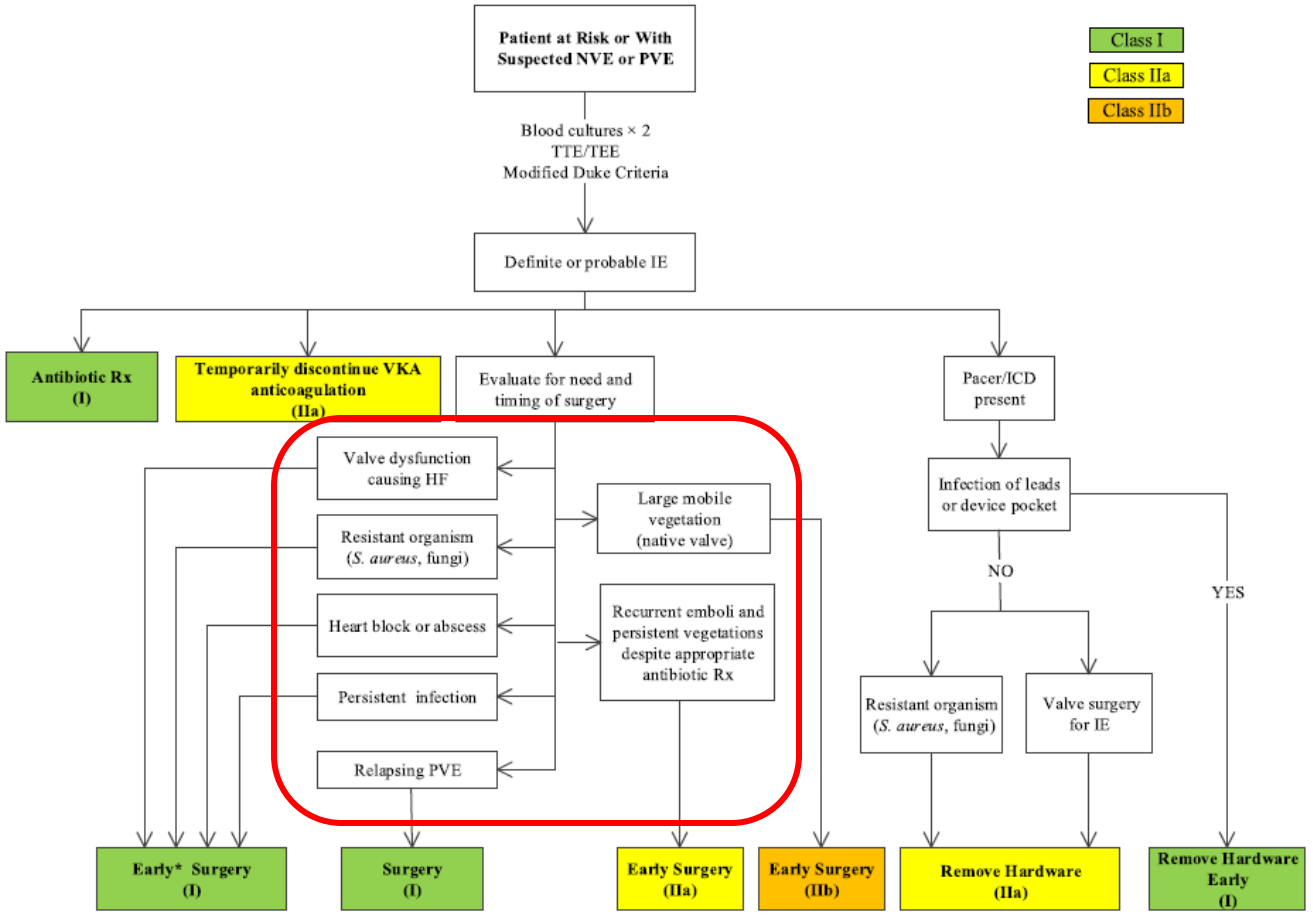

Figure 9. Diagnosis and Treatment of IE

*Early surgery defined as during initial hospitalization before completion of a full therapeutic course of antibiotics.
HF indicates heart failure; ICD, implantable cardioverter-defibrillator; IE, infective endocarditis; NVE, native valve endocarditis; PVE, prosthetic valve endocarditis; Rx, therapy; S. aureus, Staphylococcus aureus; TEE, transesophageal echocardiography; TTE, transthoracic echocardiography; and VKA, vitamin K antagonist.

IIb	B-NR

See Online Data Supplement 24 (Updated From 2014 VHD

Operation without delay may be considered in patients with IE and an indication for surgery who have suffered a stroke but have no evidence of intracranial hemorrhage or extensive neurological damage (284,285).

IIb	B-NR

See Online Data Supplement 24 (Updated From 2014 VHD

Delaying valve surgery for at least 4 weeks may be considered for patients with IE and major ischemic stroke or intracranial hemorrhage if the patient is hemodynamically stable (286).

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Guyton RA, O'Gara PT, Ruiz CE, Skubas NJ, Sorajja P, Sundt TM 3rd, Thomas JD; American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary. J Am Coll Cardiol. 2014 Jun 10;63(22):2438-88.

ΒΑΛΒΙΔΟΠΑΘΕΙΑ ΑΟΡΤΙΚΗΣ & ΜΗ ΚΑΡΔΙΟΧΕΙΡΟΥΡΓΙΚΗ ΕΠΕΜΒΑΣΗ

CLASS IIa

1. **Moderate-risk elective noncardiac surgery with appropriate intraoperative and postoperative hemodynamic monitoring is reasonable to perform in patients with asymptomatic severe AS (917,920–922). (*Level of Evidence: B*)**

Επείγουσα μη καρδιοχειρουργική επέμβαση προηγείται

Balloon aortic valvotomy may be considered as a bridge to SAVR or TAVI in haemodynamically unstable patients or in patients with symptomatic severe aortic stenosis who require urgent major non-cardiac surgery.	IIb	C

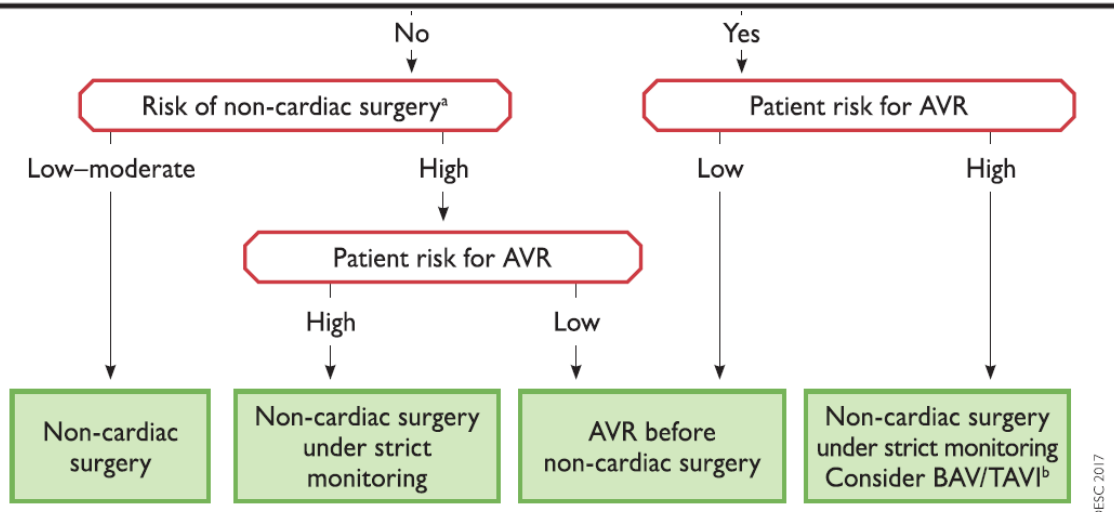

Figure 11 Management of severe aortic stenosis and elective non-cardiac surgery according to patient characteristics and type of surgery. AS = aortic stenosis; AVR = aortic valve replacement; BAV = balloon aortic valvuloplasty; TAVI = transcatheter aortic valve implantation.
[a]Classification into three groups according to the risk of cardiac complications (30-day death and myocardial infarction) for non-cardiac surgery (high-risk >5%; intermediate risk 1–5%; low risk <1%).[196]
[b]Non-cardiac surgery performed only if strictly needed. The choice between percutaneous aortic valvuloplasty and TAVI should take into account patient life expectancy.

•Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, Iung B, Lancellotti P, Lansac E, Rodriguez Muñoz D, Rosenhek R, Sjögren J, Tornos Mas P, Vahanian A, Walther T, Wendler O, Windecker S, Zamorano JL; ESC Scientific Document Group. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2017 Sep 21;38(36):2739-2791.

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ΜΕΤΑΛΛΙΚΗ Ή ΒΙΟΛΟΓΙΚΗ ΒΑΛΒΙΔΑ- CCS GUIDELINES

Recommendation for valve replacement with a mechanical prosthesis

Indication	Class	
1. Patients with expected long lifespans	I	B
2. Patients with a mechanical prosthetic valve already in place in a different position than the valve to be replaced	I	B
3. Patients requiring warfarin therapy because of risk factors* for thromboembolism	IIa	C
4. Patients ≤65 years for AVR and ≤70 years for MVR	IIa	C
5. Valve replacement for thrombosed biological valve	IIb	C
Contraindication		
6. Patients in renal failure, on hemodialysis, or with hypercalcemia	III	C
7. Patients who cannot or will not take warfarin therapy	III	C

**Risk factors: atrial fibrillation, severe left ventricular dysfunction, previous thromboembolism, and hypercoagulable condition; The age at which patients may be considered for bioprosthetic valves is based on the major reduction in rate of structural valve deterioration after age 65 and the increased risk of bleeding in this age group. Adopted and modified from American College of Cardiology and American Heart Association Guidelines (29)*

Recommendations for valve replacement with a bioprosthesis

Indication	Class	
1. Patients who cannot or will not take warfarin therapy	I	C
2. Patients ≥65 years* needing AVR who do not have risk factors for thromboembolism	I	B
3. Patients considered to have possible compliance problem with warfarin therapy	IIa	C
4. Patients >70 years* needing MVR who do not have risk factors for thromboembolism	IIa	B
5. Valve replacement for thrombosed mechanical valve	IIb	C
6. Patients <65 years*	IIb	C
7. Patients in renal failure, on hemodialysis, or with hypercalcemia	IIa	C
Contraindication		
8. Adolescent patients who are still growing	III	C

**The age at which patients should be considered for bioprosthetic valves is based on the major reduction in rate of structural valve deterioration after age 65 and increased risk of bleeding in this age group; Risk factors: atrial fibrillation, severe LV dysfunction, previous thromboembolism, and hypercoagulable condition. Adopted and modified from American College of Cardiology and American Heart Association Guidelines (29). AVR Aortic valve replacement; MVR Mitral valve replacement*

•Surgical management of valvular heart disease. Can JCan J Cardiol Vol 20 Suppl E October 2004

ΜΕΤΑΛΛΙΚΗ Ή ΒΙΟΛΟΓΙΚΗ ΒΑΛΒΙΔΑ- ESC/EACTS GUIDELINES

Recommendations	Class[a]	Level[b]
A mechanical prosthesis is recommended according to the desire of the informed patient and if there are no contraindications to long-term anticoagulation.[c]	I	C
A mechanical prosthesis is recommended in patients at risk of accelerated structural valve deterioration.[d]	I	C
A mechanical prosthesis should be considered in patients already on anticoagulation because of a mechanical prosthesis in another valve position.	IIa	C
A mechanical prosthesis should be considered in patients <60 years of age for prostheses in the aortic position and <65 years of age for prostheses in the mitral position.[e]	IIa	C
A mechanical prosthesis should be considered in patients with a reasonable life expectancy[f] for whom future redo valve surgery would be at high risk.	IIa	C
A mechanical prosthesis may be considered in patients already on long-term anticoagulation due to the high risk for thromboembolism.[g]	IIb	C

Recommendations	Class[a]	Level[b]
A bioprosthesis is recommended according to the desire of the informed patient.	I	C
A bioprosthesis is recommended when good-quality anticoagulation is unlikely (compliance problems, not readily available) or contraindicated because of high bleeding risk (previous major bleed, comorbidities, unwillingness, compliance problems, lifestyle, occupation).	I	C
A bioprosthesis is recommended for reoperation for mechanical valve thrombosis despite good long-term anticoagulant control.	I	C
A bioprosthesis should be considered in patients for whom there is a low likelihood and/or a low operative risk of future redo valve surgery.	IIa	C
A bioprosthesis should be considered in young women contemplating pregnancy.	IIa	C
A bioprosthesis should be considered in patients >65 years of age for a prosthesis in the aortic position or > 70 years of age in a mitral position or those with a life expectancy[c] lower than the presumed durability of the bioprosthesis.[d]	IIa	C

•Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, Iung B, Lancellotti P, Lansac E, Rodriguez Muñoz D, Rosenhek R, Sjögren J, Tornos Mas P, Vahanian A, Walther T, Wendler O, Windecker S, Zamorano JL; ESC Scientific Document Group. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. Eur Heart J. 2017 Sep 21;38(36):2739-2791.

ΜΕΤΑΛΛΙΚΗ Ή ΒΙΟΛΟΓΙΚΗ ΒΑΛΒΙΔΑ- AHA/ACC GUIDELINE

Table 23. Summary of Recommendations for Prosthetic Valve Choice

Recommendations	COR	LOE	References
Choice of valve intervention and prosthetic valve type should be a shared decision process	I	C	N/A
A bioprosthesis is recommended in patients of any age for whom anticoagulant therapy is contraindicated, cannot be managed appropriately, or is not desired	I	C	N/A
A mechanical prosthesis is reasonable for AVR or MVR in patients <60 y of age who do not have a contraindication to anticoagulation	IIa	B	(534–536)
A bioprosthesis is reasonable in patients >70 y of age	IIa	B	(537–540)
Either a bioprosthetic or mechanical valve is reasonable in patients between 60 y and 70 y of age	IIa	B	(541,542)
Replacement of the aortic valve by a pulmonary autograft (the Ross procedure), when performed by an experienced surgeon, may be considered in young patients when VKA anticoagulation is contraindicated or undesirable	IIb	C	N/A

AVR indicates aortic valve replacement; COR, Class of Recommendation; LOE, Level of Evidence; MVR, mitral valve replacement; N/A, not applicable; and VKA, vitamin K antagonist.

IIa B-NR See Online Data Supplement 20 (Updated From 2014 VHD Guideline)	An aortic or mitral mechanical prosthesis is reasonable for patients less than 50 years of age who do not have a contraindication to anticoagulation (141,149,151,155-157).	MODIFIED: LOE updated from B to B-NR. The age limit for mechanical prosthesis was lowered from 60 to 50 years of age.
IIa B-NR See Online Data Supplement 20 (Updated From 2014 VHD Guideline)	For patients between 50 and 70 years of age, it is reasonable to individualize the choice of either a mechanical or bioprosthetic valve prosthesis on the basis of individual patient factors and preferences, after full discussion of the trade-offs involved (141-145,157-160).	MODIFIED: Uncertainty exists about the optimum type of prosthesis (mechanical or bioprosthetic) for patients 50 to 70 years of age. There are conflicting data on survival benefit comparing mechanical versus bioprosthetic valves in this age group, with equivalent stroke and thromboembolic outcomes. Patients receiving a mechanical valve incur greater risk of bleeding, and those undergoing bioprosthetic valve replacement more often require repeat valve surgery.

!!!

•Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Fleisher LA, Jneid H, Mack MJ, McLeod CJ, O'Gara PT, Rigolin VH, Sundt TM 3rd, Thompson A. 2017 AHA/ACC Focused Update of the 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 Clinical Practice Guidelines. J Am Coll Cardiol. 2017 Jul 11;70(2):252-289.

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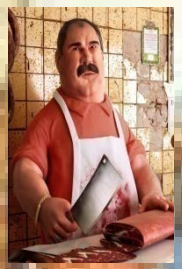

ΕΥΧΑΡΙΣΤΩ ΓΙΑ ΤΗΝ ΠΡΟΣΟΧΗ ΣΑΣ!!!