1. The guideline continues to recommend the use of disease stages among patients with valvular heart disease, consisting of Stage A (at risk), Stage B (progressive), Stage C (asymptomatic severe; with ventricular compensation [Stage C1] or with ventricular decompensation [Stage C2]), and Stage D (symptomatic severe). Disease stages should be assigned based on valve anatomy, the severity of valve dysfunction, the ventricular and pulmonary circulation response to valve dysfunction, and symptoms.
2. Among patients with atrial fibrillation and native heart valve disease other than rheumatic mitral stenosis, or among patients with atrial fibrillation and a bioprosthesis >3 months after valve replacement, a non–vitamin K oral anticoagulant (NOAC) is an effective alternative to anticoagulation with a vitamin K antagonist (VKA); among these patients, either a NOAC or VKA should be used based on the CHA2DS2-VASc score. Anticoagulation with a VKA should be used among patients with atrial fibrillation and rheumatic mitral stenosis. A NOAC should not be used in patients with a mechanical prosthesis without or with atrial fibrillation.
3. All patients with severe valvular heart disease being considered for intervention should be evaluated by a Multidisciplinary Heart Valve Team. Consultation with or referral to a Primary Valve Center or a Comprehensive Valve Center is reasonable for the discussion of treatment options in the setting of asymptomatic patients with severe valve disease, patients who might benefit from valve repair rather than valve replacement, and among patients with multiple comorbidities.

Comprehensive Valve Center

Advancements in evaluation and therapy of valvular heart disease have extended the benefits of treatment to increasing numbers of patients. Patients being evaluated for valve disease are older and more medically complex than in the past. Newer therapies offer the potential of treating patients less invasively and resulting in better outcomes. Selecting the optimal approach for each individual patient requires a collaborative effort between cardiologists, cardiac surgeons, cardiac imaging specialists, and intensivists.

To address this need, the physicians of the Oregon Heart & Vascular Institute have created the Comprehensive Valve Center. The center is a multidisciplinary effort designed to provide the most appropriate and up-to-date care for patients with valve disease, and to create a responsive, seamless, and integrated experience for patients, their families, and referring physicians. The center offers:

- Weekly multidisciplinary case conferences to discuss optimal treatment of complex patients.
- Involvement of primary care physicians through case conferences, phone consultations, or telemedicine.
- Use of evidence-based guidelines for the evaluation, treatment and follow-up of patients with valve disease.
- Automated reminders to patients for clinical follow-up and testing with their primary care physician and the valve center.
- Access to investigational procedures and techniques for patients who are not candidates for conventional therapy.

Oregon Heart & Vascular Institute
3311 RiverBend Drive
Springfield, OR 97477

541-222-7218
888-240-6484

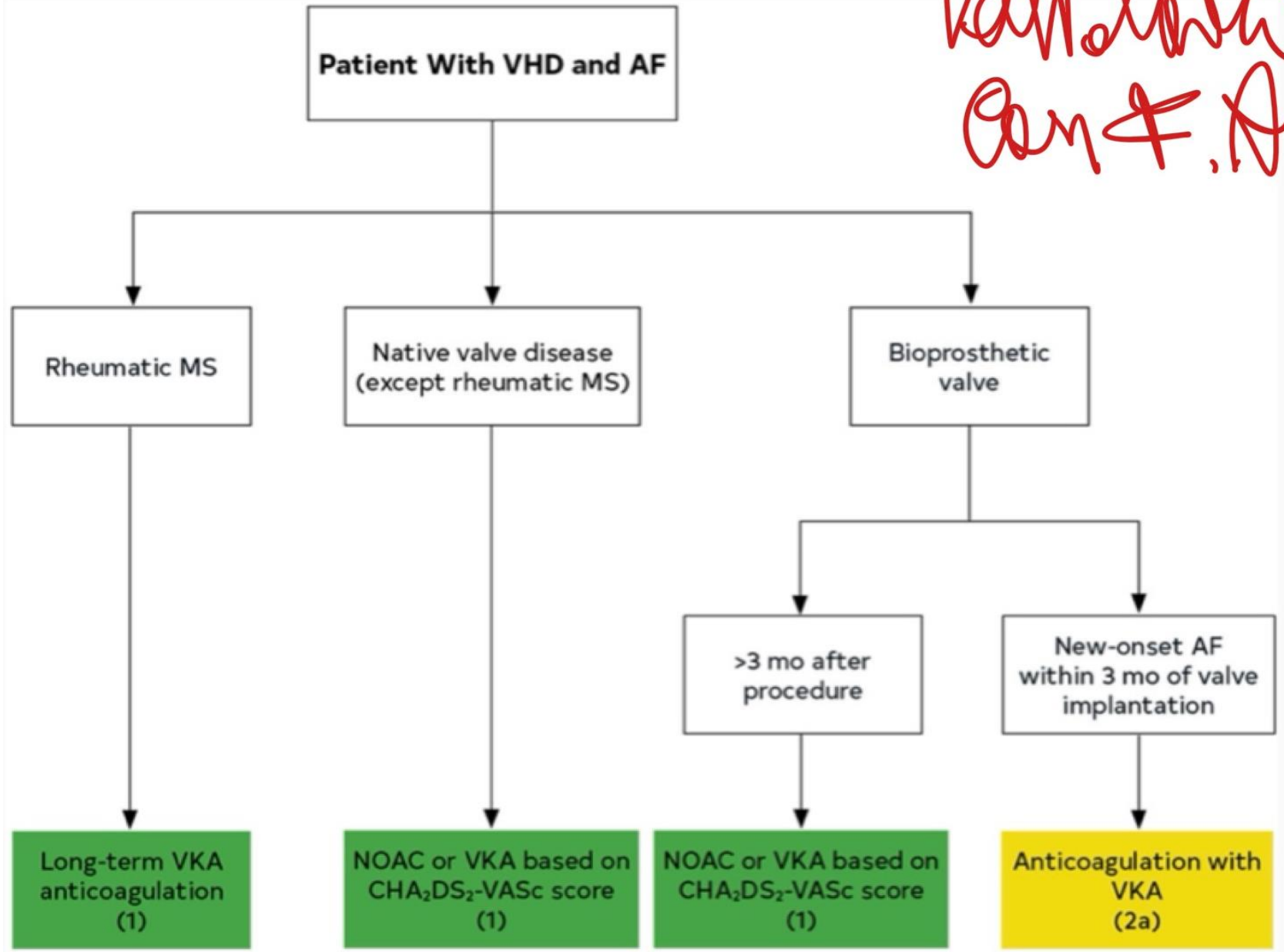
www.ohvi.org

CARDIOLOGISTS

Phoebe A. Ashley, MD
Stephen L. Cook, MD
Dennis J. Gory, MD
John W. Gundry, MD
Jerold A. Hawn, MD
Michael J. Menen, MD
Frances C. Munkenbeck, MD
Richard C. Padgett, MD
David R. Saenger, MD
Matthew R. Trojan, MD

CARDIOVASCULAR RADIOLOGISTS

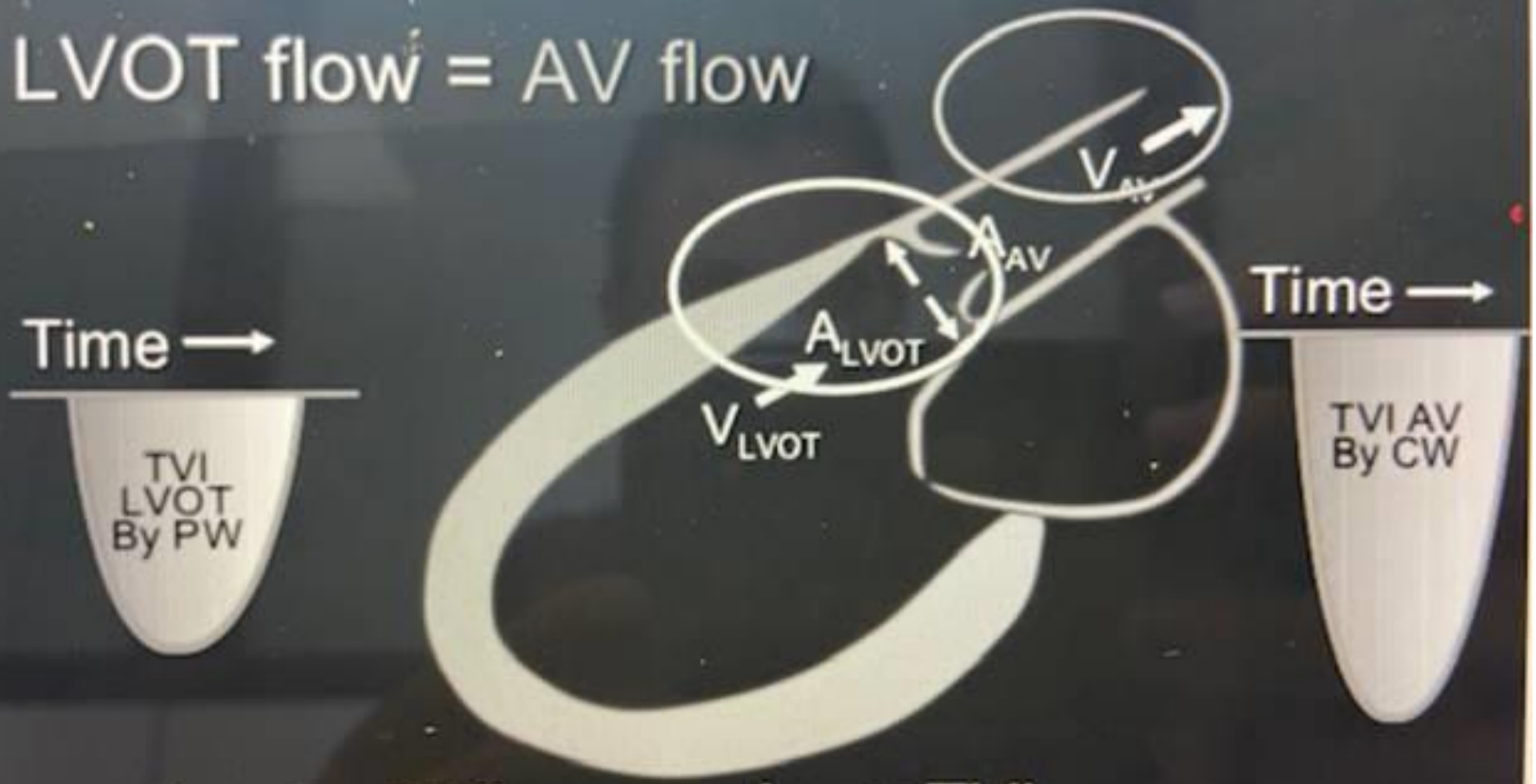
Jon E. Ekstrom, MD
Mathews B. Fish, MD
Matthew J. Thomson, MD


Patient With VHD and AF
Rheumatic MS
Native valve disease (except rheumatic MS)
Bioprosthetic valve
>3 mo after procedure
New-onset AF within 3 mo of valve implantation
Long-term VKA anticoagulation (1)
NOAC or VKA based on CHA_2DS_2-VASc score (1)
NOAC or VKA based on CHA_2DS_2-VASc score (1)
Anticoagulation with VKA (2a)

4. Among patients with severe symptomatic (Stage D) AS, the disease is subcategorized based on the gradient, flow, and left ventricular ejection fraction (LVEF). Stage D1 reflects patients with high-gradient symptomatic AS (Vmax ≥4.0 m/s, mean gradient ≥40 mm Hg, aortic valve area [AVA] ≤1.0 cm2); Stage D2 reflects low-flow, low-gradient severe AS with reduced LVEF (AVA ≤1.0 cm2, Vmax <4.0 m/s or mean gradient <40 mm Hg, LVEF <50%); and Stage D3 reflects low-flow, low-gradient severe AS with normal LVEF ("paradoxical low-flow severe AS"; LVEF ≥50%, stroke volume index <35 ml/m2).
5. Intervention for severe AS predominantly is based on the presence of symptoms or LV systolic dysfunction (Class 1); or in asymptomatic patients at low surgical risk with decreasing exercise tolerance or exercise-associated decrease ≥10 mm Hg in systolic blood pressure, very severe AS (Vmax ≥5.0 m/s), serum B-type natriuretic peptide (BNP) >3 times normal, or progression of Vmax ≥0.3 m/s per year (Class 2a). In addition, intervention can be considered among asymptomatic patients with severe high-gradient AS and a progressive decrease in LVEF to <60% on ≥3 serial imaging studies (Class 2b).

Continuity Equation

LVOT flow = AV flow



$$A_{LVOT} \times TVI_{LVOT} = A_{AV} \times TVI_{AV}$$

$$A_{AV} = (A_{LVOT} \times TVI_{LVOT}) / TVI_{AV}$$

Gorlin formula for estimating aortic valve area

$$AVA(cm^2) = \frac{CO/(SEP)\,(HR)}{44.3 \times \sqrt{\text{mean pressure gradient}}}$$

CO = cardiac output (mL/min); HR = heart rate; SEP = systolic ejection period (s/beat); 44.3 = constant.

Hakki formula

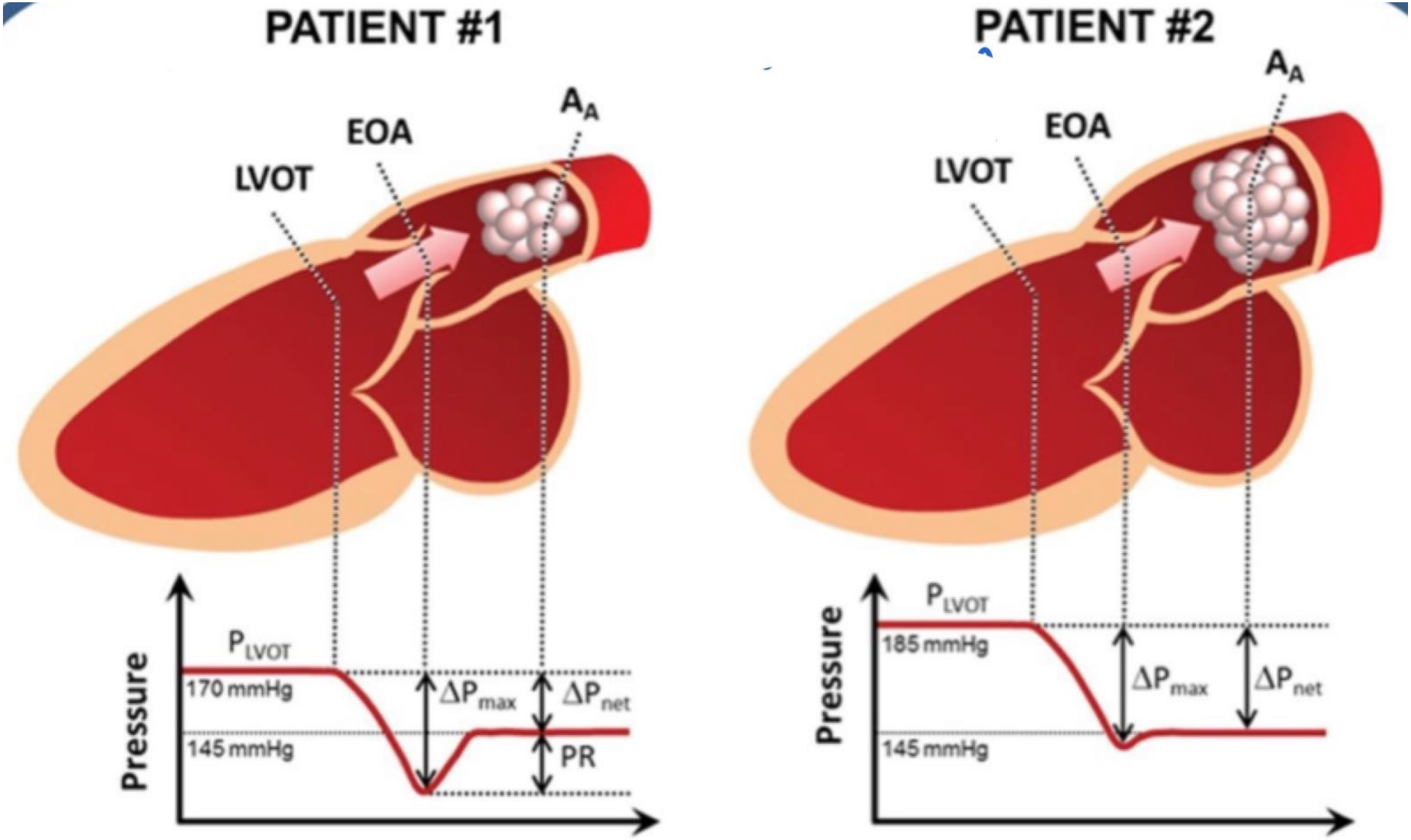
$$AVA(cm^2) = \frac{CO(L/min)}{(\sqrt{\text{peak LV systolic pressure} - \text{peak aortic systolic pressure}})}$$

Dimensionless Severity Index

- Se il diametro del tratto di efflusso VS non è misurabile usa:

- Dimensionless index $= \frac{TVI_{LVOT}}{TVI_{AV}}$

- Severity index < 0.25 indicates severe AS


PATIENT #1
LVOT
EOA
A_A
Pressure
P_{LVOT}
170 mmHg
145 mmHg
ΔP_{max}
ΔP_{net}
PR
PATIENT #2
LVOT
EOA
A_A
Pressure
P_{LVOT}
185 mmHg
145 mmHg
ΔP_{max}
ΔP_{net}

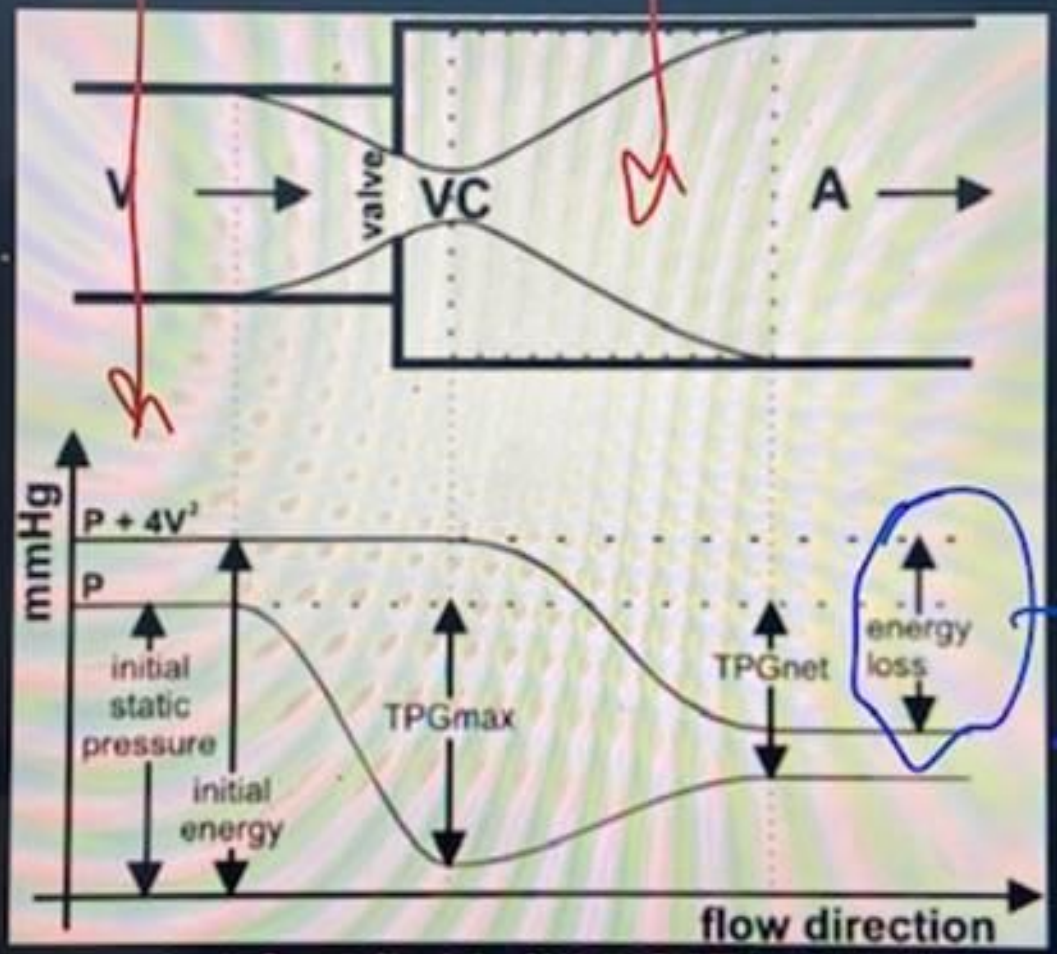
Pressure Recovery

Più il flusso si avvicina all'orifizio stenotico più aumentà la velocità (Energia cinetica) e si riduce la pressione (energia potenziale).

A livello della stenosi sarà quindi massima la velocità e minima la pressione.

Subito a valle della stenosi inizia il processo inverso: si riduce la velocità ed aumenta la pressione.

Schematic representation of system composed of left ventricle, aortic valve, and ascending aorta, with corresponding static pressure (P) and energy in terms of total pressure (P+4V2)



Garcia, D. et al. Circulation 2000;101:765-771

Circulation

Pressure Recovery

Il fenomeno del recupero di pressione a valle della stenosi è tanto maggiore quanto minore è la sezione del vaso (cioè dell'aorta ascendente),

In caso di aorta "piccola" (< 30 mm) si verifica perciò una soprastima della stenosi se non si tiene conto di ciò correggendo opportunamente usando la formula dell'ELI (Energy Loss Index)

AVA E' DEEMFATIZZATA

ELI = Energy Loss Index

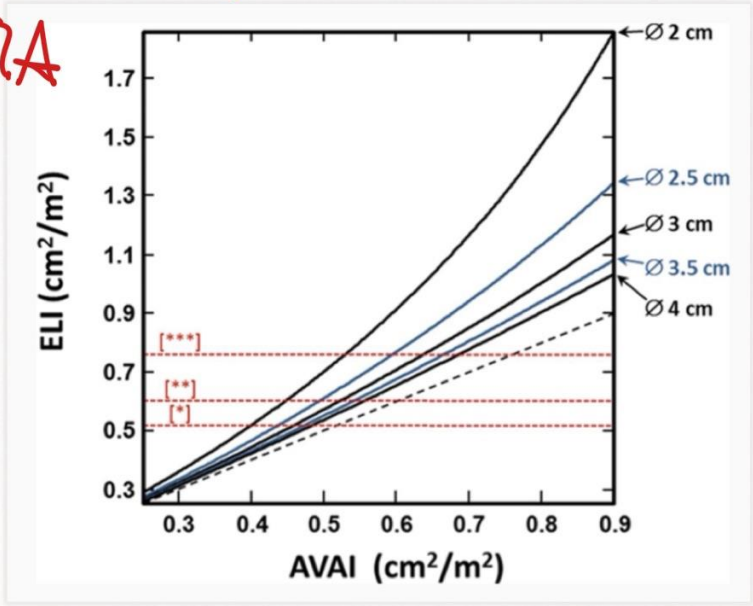
PARAMETRI FISIOLOGICI

$$ELI = [(AVA \times A_A)/(A_A - AVA)]/BSA$$

$< 0{,}6\ cm^2/m^2$

SAO5 E VERA

alla giunzione sinotubulare



② Z_{VA} = Impedenza valvolo aortica

= (PAS + Gradiente medio) / SVI

$Z_{VA} \geq 4{,}5$ mmHg / mL / m²

outcome sfavorevole per STAZIONE

③ DOBUTAMINA distinguere vera STO da pseudoSTO

6. Among patients in whom a bioprosthesis is appropriate, decisions between surgical aortic valve replacement (SAVR) and transcatheter aortic valve implantation (TAVI) should include the presence of symptoms, patient age and anticipated life expectancy, the indication for intervention, predicted surgical risk, and anatomy or other factors referable to transfemoral (TF) TAVI feasibility (all Class 1):
    - SAVR is preferred among patients <65 years of age or with life expectancy >20 years.
    - SAVR is preferred if vascular anatomy or other factors preclude TF TAVI.
    - SAVR is preferred among asymptomatic patients with a Class 2a indication for intervention, such as an abnormal exercise test, very severe AS, rapid progression, or elevated BNP.
    - If feasible, TF TAVI is preferred among patients >80 years of age or with life expectancy <10 years.
    - SAVR or TF TAVI is recommended after shared decision making among symptomatic patients ages 65-80 years with no contraindication to TF TAVI.
    - TAVI is preferred among symptomatic patients of any age with high or prohibitive surgical risk, if predicted survival after intervention is >12 months with an acceptable quality of life.
    - After shared decision making, palliative care is recommended among symptomatic patients with predicted post-TAVI survival <12 months or for whom minimal improvement in quality of life is expected.