

Aortic Insufficiency



Classification -1

▣ ***Abnormalities of the Leaflets***

- *Rheumatic, Bicuspid, Degenerative*
- *Endocarditis*

▣ ***Dilation of the Aortic Annulus***

- *Aortic Aneurysm / Dissection*
- *Inflammatory (Syphillis, Giant Cell Arteritis. Coll Vasc Dis-Ankylosis Spondylitis, Reiters)*
- *Inheritable (Marfans, Osteogenesis Imperfecta)*

Classification -2

Chronic

Congenital bicuspid aortic valve

Heritable connective tissue disorders

(Marfan syndrome, Ehlers-Danlos syndrome, adult polycystic kidney disease, annuloaortic ectasis, cystic media necrosis, floppy aortic valve, aortic valve prolapse, sinus of Valsalva aneurysm)

Rheumatic fever

Syphilis

Aortitis (Takayashu)

Ankylosing spondylitis

Reiter's syndrome

Rheumatoid arthritis

Systemic lupus erythematosus

Acute

Infective endocarditis

Trauma

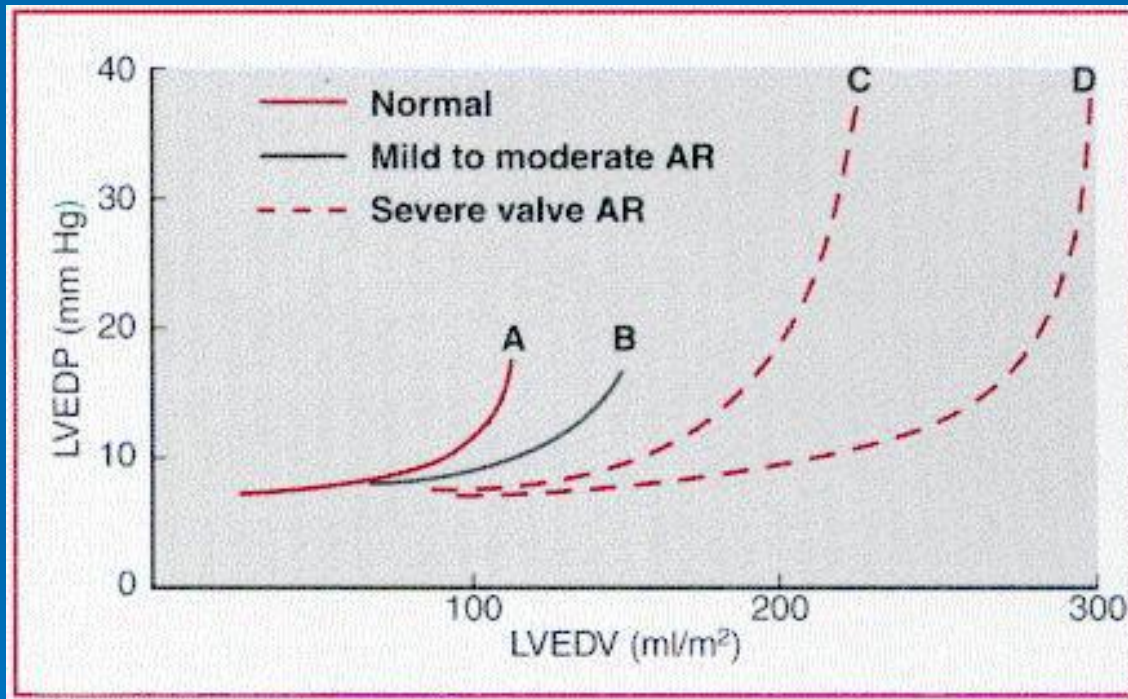
Acute aortic dissection

Prosthetic valve malfunction

Chronic AI - Pathophysiology

- **increased LV EDV**
- addition of new sarcomeres in series/ elongation of myocytes and myocardial fibers (**Eccentric** Hypertrophy)
- enlarged chamber/ increased wall stress is stimulus for **concentric** hypertrophy
- dilatation and hypertrophy with resultant recruitment of preload reserve allow compensation and maintenance of LV systolic function
- may be asymptomatic for decades until decompensated state develops, wall thickening unable to keep pace with hemodynamic load, **increased interstitial fibrosis and decreased compliance** □ symptoms of CHF ensue

Pressure Volume Relationships in Chronic AI



CO at rest may approach 25 L/min in severe AI with little increase in EDP
very large EDV (Cor Bovinum)

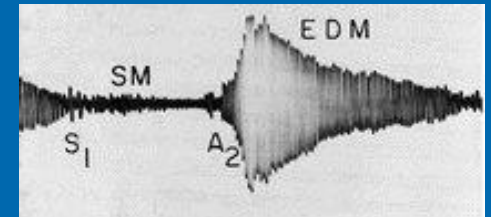
History

- DOE, Orthopnea, PND
 - usually after 4th / 5th decade and significant cardiomegaly and LV dysfx
- Angina pectoris
 - develops later, nocturnal symptoms prominent; often with diaphoresis due to HR slowing with arterial DBP falling to low levels
- Palpitations / Head pounding
 - especially in supine position, pounding of heart against chest wall
 - tachycardia from stress/exertion may precipitate and cause extreme discomfort for pt

Physical Findings

□ Diastolic murmur

- high frequency, sitting up, leaning forward
- duration > intensity correlates with severity
- mild AR – early diastole, hi pitched blowing
- severe AR – holodiastolic, rough
- musical (“cooing dove”) – eversion/perforation of Ao cusp
- Primary valve dz – heard best LSB 3-4 intercostal
- Ao Root dz – heard best RSB



□ Austin Flint murmur

- mid-late diastolic apical rumble – severe AR

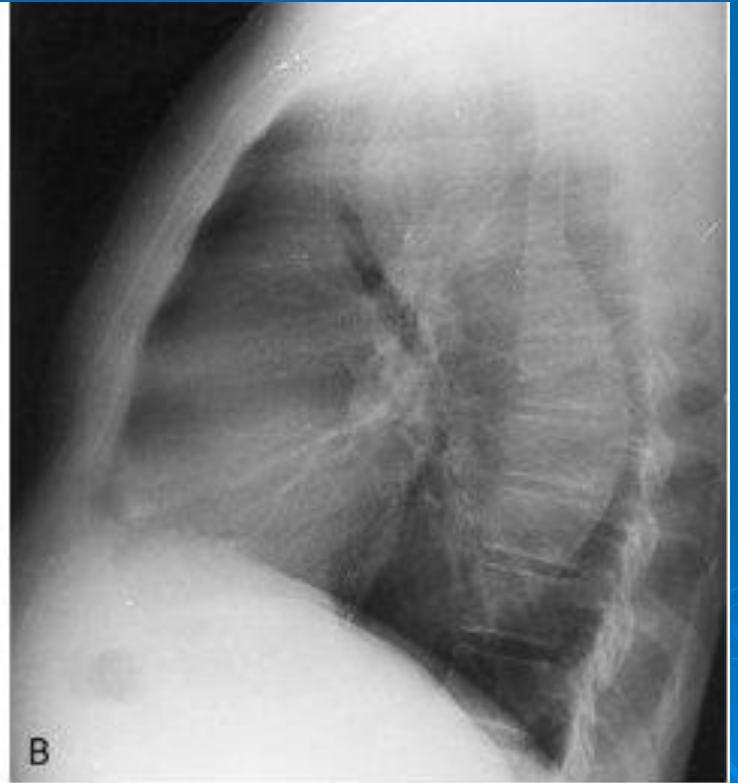
□ Wide Pulse Pressure

□ Systolic flow murmur (/thrill)

Peripheral Signs of Severe Aortic Regurgitation

- Quincke's sign: capillary pulsation
- Corrigan's sign: water hammer pulse
- Bisferiens pulse (AS/AR > AR)
- De Musset's sign: systolic head bobbing
- Mueller's sign: systolic pulsation of uvula
- Durosier's sign: femoral retrograde bruits
- Traube's sign: "pistol shot" on auscultation of femorals artery
- Hill's sign: BP Lower extremity > BP Upper extremity by
 - > 20 mm Hg - mild AR
 - > 40 mm Hg – mod AR
 - > 60 mm Hg – severe AR
- Apical impulse - diffuse, hyperdynamic and displaced inf/lat

CXR



ECHO

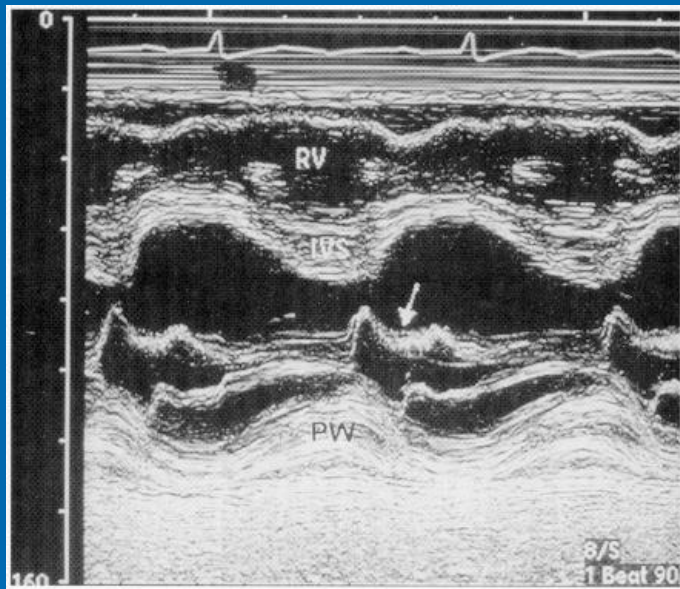
□ 2D/ M-Mode

- AV/ Ao Root anatomic abnormalities
- LV dimension / sphericity
- AMVL – fluttering, reverse doming
- increased EPSS

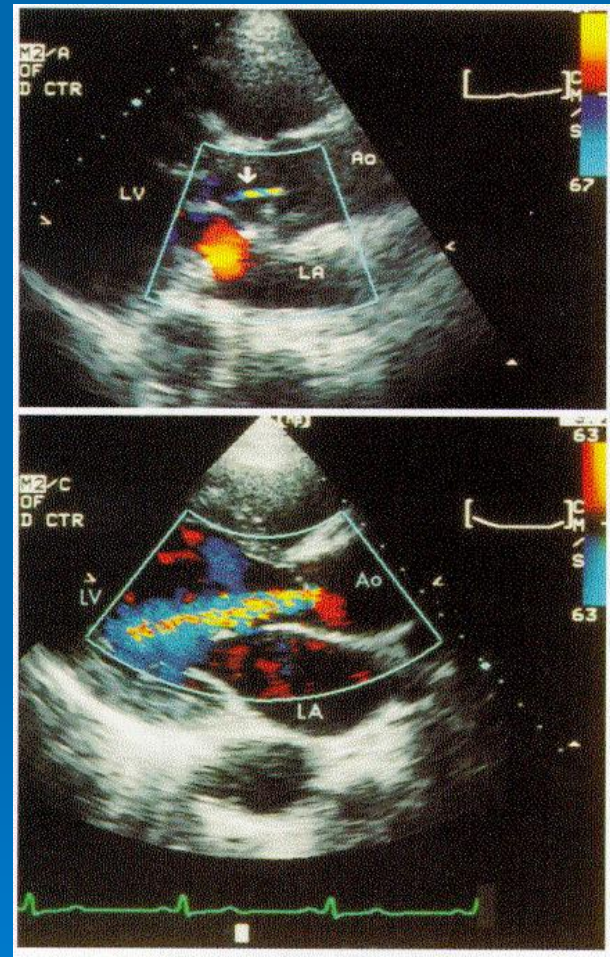
□ Doppler

- Color Flow Mapping
- Continuous Wave
- Flow reversal in desc Ao (100% sens 97% spec for severe AI)

□ Limitations – What is severe AI?

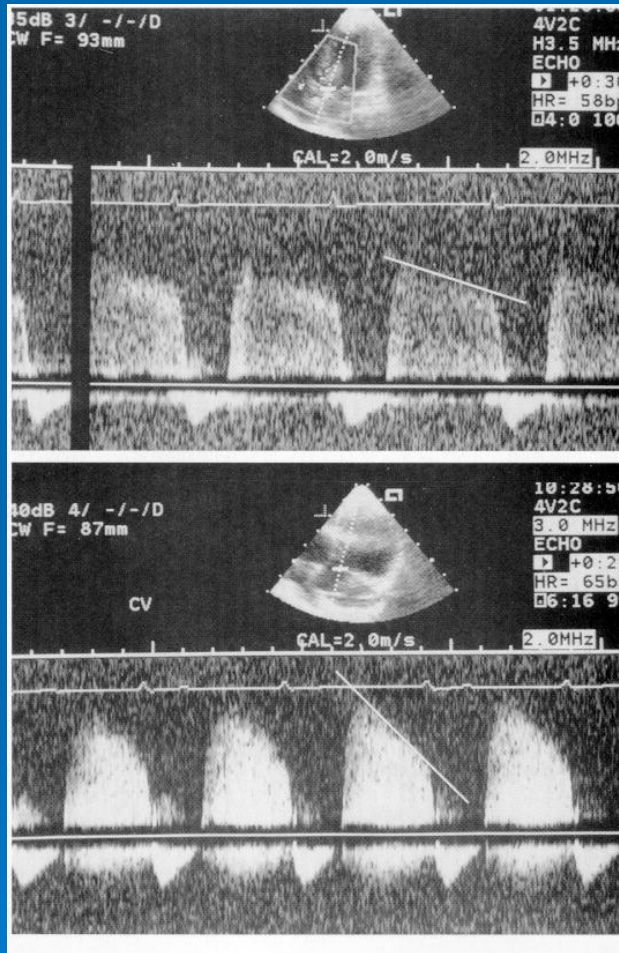


AMVL fluttering



Color Flow – top mild, bottom moderate

Continuous Wave Doppler

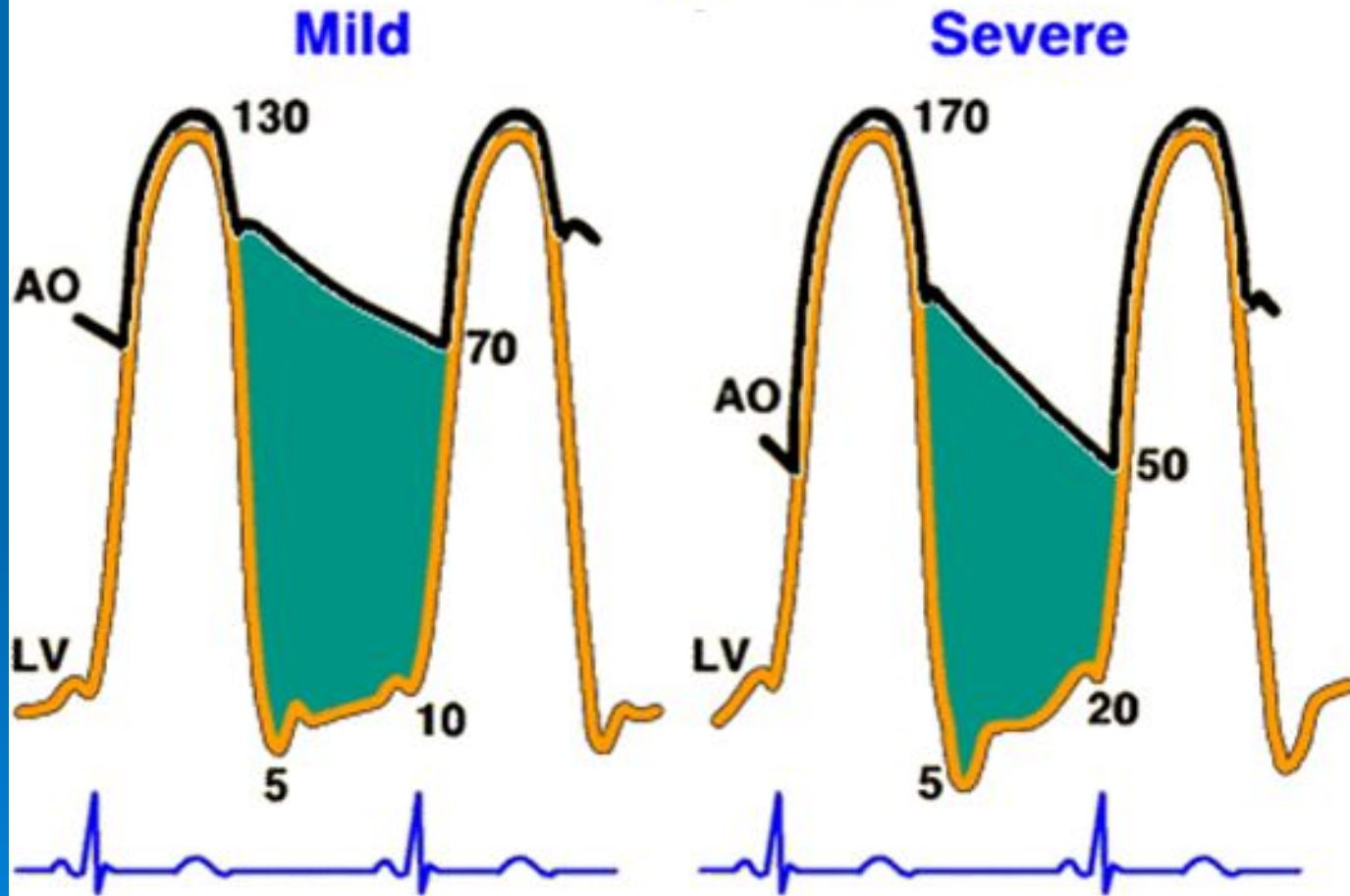


Chronic AI

Acute AI

Cath

Aortic Regurgitation



Medical Management

□ Vasodilators

- goal is to reduce SBP, improve forward SV, reduce regurgitant volume

□ Uses

- severe AR + symptoms of LV dysfxn
- short term hemodynamic improvement in pt with symptomatic AR before AVR
- prolong compensated phase of asymptomatic patients
- No indication for asymptomatic pt with mild AI and normal LV fxn

□ Studied in AI

- Nifedipine, Hydralazine, ACEI, Nipride, Prazosin
- Children/ severe AR – ACEI reversed LV dilatation/wall stress
- avoid (-) inotrope in LV dysfx

Timing of Surgery

- Goal is to intervene **before** irreversible LV systolic dysfx ensues
 - initially reversible, mainly due to afterload excess – full recovery in LV size/fx possible
 - with progressive chamber dilatation, decreased myocardial contractility >> afterload excess as cause of LV dysfx.
 - associated with worse recovery of LV fx and increased mortality

Surgical Therapy

- Indications for AVR (Severe AR)¹
 - Symptoms (NYHA III-IV) regardless of LV fxn
 - Symptoms (NYHA II) with evidence of progressing LV dysfx (LV ESD ~ 55, LV EF <50-55%)
 - Angina (CHA Class II or higher) w or w/o CAD
 - mild-mod LV dysfx (EF 25-49%) regardless of symptoms
 - mod-sev AR and undergoing CABG or other valvular surgery
- Predictors of Postoperative Prognosis
 - LV systolic function
 - LV End Systolic Size (LV ESD)

¹ Bonow, et al. Circulation
1998;98:1949-84

Level of evidence A	Data derived from multiple randomized clinical trials or meta-analyses.
Level of evidence B	Data derived from a single randomized clinical trial or large non-randomized studies.
Level of evidence C	Consensus of opinion of the experts and/or small studies, retrospective studies, registries.

Classes of recommendations	Definition	Suggested wording to use
Class I	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended/is indicated
Class II	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.	
<i>Class IIa</i>	<i>Weight of evidence/opinion is in favour of usefulness/efficacy.</i>	Should be considered
<i>Class IIb</i>	<i>Usefulness/efficacy is less well established by evidence/opinion.</i>	May be considered
Class III	Evidence or general agreement that the given treatment or procedure is not useful/effective; and in some cases may be harmful.	Is not recommended

Aortic Valve Replacement

Recommendations

AVR is indicated for symptomatic patients with severe AR regardless of LV systolic function (stage D)

AVR is indicated for asymptomatic patients with chronic severe AR and LV systolic dysfunction (LVEF <50%) (stage C2)

AVR is indicated for patients with severe AR (stage C or D) while undergoing cardiac surgery for other indications

AVR is reasonable for asymptomatic patients with severe AR with normal LV systolic function (LVEF $\geq$ 50%) but with severe LV dilation (LVESD >50 mm, stage C2)

AVR is reasonable in patients with moderate AR (stage B) who are undergoing other cardiac surgery

AVR may be considered for asymptomatic patients with severe AR and normal LV systolic function (LVEF $\geq$ 50%, stage C1) but with progressive severe LV dilation (LVESD >65 mm) if surgical risk is low*

Surgical Options

- Ao Root disease
 - annuloplasty or other valve sparing surgery possible if pure Ao Root dz
- Primary AV disease
 - valve replacement

AV sparing conduit

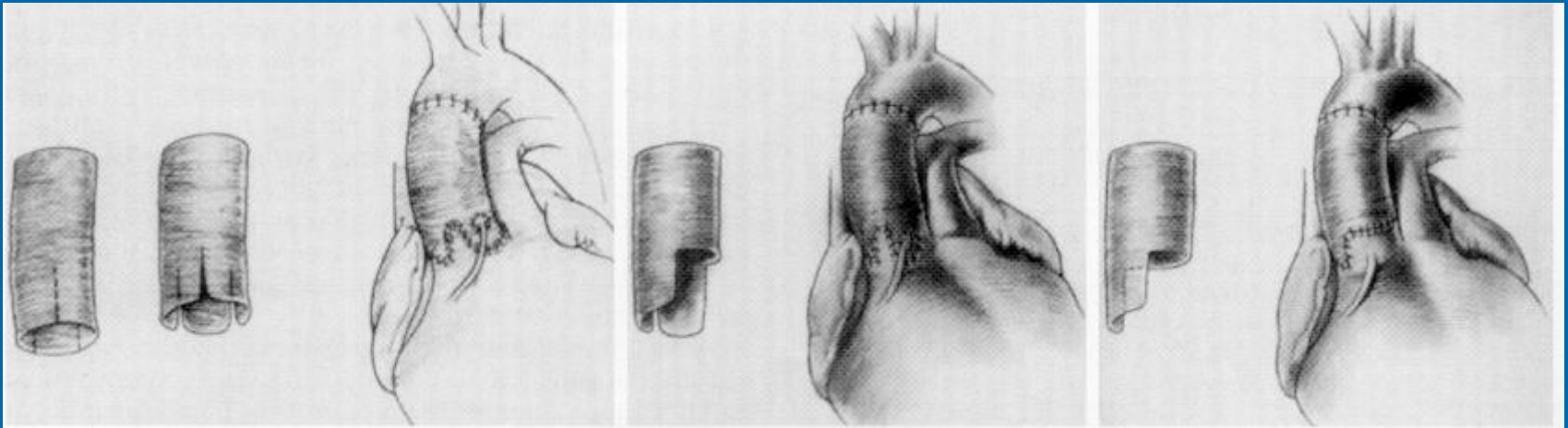


Figure 46-42 Repair of the aortic valve in patient with severe AR. Conduit tailoring in the supravalyvular position. The conduit is cut to replace three (*left*), two (*middle*), or one (*right*) individual sinuses. The aortic aneurysm is replaced and the valve is spared.
(From David TE, Feindel CM, Bos J: Repair of the aortic valve in patients with aortic insufficiency and aortic root aneurysm. *J Thorac Cardiovasc Surg* 109:345, 1995.)

Rx of Acute AI

□ Treat cause of acute AI

- Dissection/Trauma
- Endocarditis
- Prosthesis malfunction

□ Urgent AVR + aortoplasty in most cases

Prophylaxis against IE

- ❑ Patients at highest risk for adverse outcomes from IE before dental procedures that involve manipulation of gingival tissue, manipulation of the periapical region of teeth, or perforation of the oral mucosa :
 - ❑ with prosthetic cardiac valves;
 - ❑ with previous IE;
 - ❑ cardiac transplant recipients with valve regurgitation due to a structurally abnormal valve;
 - ❑ congenital heart disease;
- ❑ Prophylaxis against IE is not recommended in patients with VHD who are at risk of IE for nondental procedures (e.g., TEE, esophagogastroduodenoscopy, colonoscopy, or cystoscopy) in the absence of active infection