

Physical Exam Keys

1. Pulmonic stenosis, and mitral valve prolapse without murmur are the only valve problems and ostium secundum ASD the only septal defect which **DO NOT** require antibiotic prophylaxis.
2. Splitting of S2
 - a. Persistently/widely split S2 (varies with inspiration but never goes away- think **Right BBB**) occurs with pulmonic stenosis, pulmonary embolism, RBBB, and left ventricular ectopic beats.
 - b. Fixed Split S2 occurs with **ASD**
 - c. Paradoxically split S2 (P2 b/4 A2) occurs with severe HCM, LBBB, RV ectopic beats, AS and PDA.
3. Right sided murmurs sound louder on Inspiration; Left sided murmurs on Expiration.
4. Cannon a waves occur in complete heart block and with ventricular pacing.
5. Systolic Murmurs
 - a. Aortic stenosis- associated w/ an ejection click if congenital or bicuspid. Radiates to carotids. Pulsus Tardus.
 - b. Mitral regurgitation- pansystolic decrescendo at apex, radiates to axilla.
 - c. Pulmonic stenosis- ejection click (right-sided). Persistently split S2. Large “a” wave. Does **not** require Abx prophylaxis.
 - d. Tricuspid regurgitation- pansystolic murmur at LLSB. Large right-sided “v” waves.
 - e. VSD- **holosystolic** at LLSB.
 - f. ASD- ostium secundum (does **NOT** require Abx prophylaxis) systolic ejection murmur (SEM) at LSB. Fixed split S2.
 - g. ASD- ostium primum- (failure of fusion b/t endocardial cushion and septum primum) SEM at LSB, fixed split S2, also often associated TR or MR murmur (due to mitral and tricuspid valve deformities)
 - h. Hypertrophic Cardiomyopathy (HOCM- Systolic anterior motion (SAM) of the mitral leaflet and asymmetric septal hypertrophy (ASH) are classic- “SAM and ASH in IHSS”) harsh midsystolic murmur often associated w/ an S4, and brisk carotid upstroke (Bifid in 2/3 of pts with HOCM). **Murmur of HOCM increases w/ standing or valsalva** (decreased venous return). Sustained handgrip **decreases** HOCM murmur.
 - i. Mitral valve prolapse with murmur- **Midsystolic click**. Late SEM follows click (if there is associated MR) “The Click-mur syndrome”. Standing or valsalva also increases this murmur and moves it earlier into systole, **but sustained handgrip increases MR murmur associated with MVP**.
 - j. Patent ductus arteriosus (PDA) continuous “machine gun” murmur (systolic+diastolic) at the LUSB. Paradoxically split S2.
6. Diastolic Murmurs
 - a. Mitral stenosis- diastolic rumble. **Opening snap- early in diastole (after S2)**. Can see hemoptysis, pregnancy often provokes symptoms.
 - b. Chronic Aortic regurgitation- high-pitched decrescendo mid to holodiastolic murmur. Can be associated with Austin Flint murmur- low rumbling diastolic murmur (due to regurg hitting ant. Mitral leaflet). **Wide pulse pressure**- leads to multiple “named” physical findings i.e. Corrigan’s pulse, Quincke’s pulse, “Water-hammer pulse”.
 - c. Tricuspid Stenosis- diastolic murmur at LSB. Giant right sided “a” waves.
7. Cardiac Tamponade- 2 hallmarks on physical exam are Pulsus Paradoxus (SBP drop > 10mmHg w/ inspiration) and JVD with no collapse during diastole (Loss of Y descent).
8. Constrictive Pericarditis- Can cause a loud presystolic knock just after S2. 2 Hallmarks of constriction are Kussmaul’s sign- **increased JVD during inspiration** and Large right-sided x and y descents- seen as **brisk collapse of jugular veins during diastole**.

Pre-op Eval.

General principle: expensive testing, invasive strategies, and revascularization are rarely if ever warranted to “get a patient through an operation”.

Surgical risk for noncardiac surgery:

High:(>5% for MI or death) Emergent major operation (particularly in elderly), aortic or major vascular operation, Peripheral vascular disease, Large fluid shifts, major blood loss or prolonged procedure.

Intermediate:(<5%) Carotid endarterectomy, intraperitoneal and intrathoracic, orthopedic procedure, prostate.

Low:(<1%) Endoscopy, cataract, breast, ECT, superficial procedures.

5 METS \cong 1 flight of stairs w/ bag of groceries.

If obtain a PTCA or stent need to wait 4-6 weeks until elective surgery.

CABG valid for 5 years if no change in symptoms.

PTCA valid for 2 years if no change in symptoms.

Major Clinical Predictors: Consider delaying elective surgery or coronary angiogram.

1. MI <7 day or <30 day w/ evidence for jeopardized myocardium (angina or + stress test)
2. Unstable coronary syndromes (unstable angina).
3. Decompensated CHF
4. Significant arrhythmia: high degree AV block, symptomatic VT, SVT w/ uncontrolled ventricular rate.
5. Severe valvular disease (severe symptomatic AS).

Intermediate Predictors: Stress test if poor exercise tolerance (<4METs) or if high risk surgery, if stress test +++ consider coronary angiogram.

1. Stable angina
2. Prior MI
3. Compensated or history of CHF
4. Diabetes

Minor Predictors: Stress test if <4 METs and high risk surgery. If stress test +++, consider angiogram.

1. Advanced age
2. Abnormal EKG (LVH, LBBB, ST-T abnormalities)
3. Rhythm other than sinus (e.g. A-fib)
4. History of stroke
5. Uncontrolled hypertension.

Treatment w/ Beta-blockers improves perioperative outcomes and should remain uninterrupted as long as possible, especially in patients w/ known CAD. (Remember the Bisoprolol study- NEJM 1999; 341(24):1789-94.)

SBE Prophylaxis +Miscellaneous Other Facts

Prophylaxis should be done with any type of prosthetic valve (even for endoscopy), congenital heart malformations (except pulmonic stenosis, MVP without MR, and secundum ASD), A-V shunt (hemodialysis pts.) any type of acquired valve disease, hypertrophic cardiomyopathy, and those w/ a history of endocarditis. Certain procedures which do not require prophylaxis include coronary angiography, CABG, barium enema, pacemaker insertion, and most surgeries.

Prophylaxis for Dental, Oral, Respiratory tract, or esophageal procedures (Follow-up dose No LONGER recommended).

- I. Standard general prophylaxis for pts @ risk: Amoxicillin 2.0 grams orally one hour b/4 procedure.
- II. Unable to take oral meds. Ampicillin 2.0 grams IM or IV 30 minutes b/4 procedure.
- III. Amoxicillin/ampicillin/penicillin-allergic patients: Clindamycin 600 mg orally one hour b/4 procedure. OR
Cephalexin or Cefadroxil 2.0 gram orally one hour b/4 procedure. OR
Azithromycin or Clarithromycin 500mg orally one hour b/4 procedure.
- IV. Amoxicillin/ampicillin/penicillin-allergic pts. Unable to take oral meds.
Clindamycin 600mg IV 30 min. b/4 procedure. OR
Cefazolin 1.0 gram IM or IV 30 min. b/4 procedure.

Prophylaxis for GU/GI procedures.

- I. High-risk patients- Ampicillin + Gentamycin (Amp 2.0 gm + gent 1.5mg/kg) IM or IV w/in 30 min b/4 procedure. 6 hours later ampicillin 1 gram IM or IV, or amoxicillin 1 gram orally.
- II. High-risk patients allergic to ampicillin/amoxicillin- Vancomycin + Gentamycin (Vanco 1gm + Gent 1.5 mg/kg) IM or IV over 1-2 hours. Complete injection/infusion within 30 min. of starting procedure.
- III. Moderate-risk patients: Amoxicillin 2 gm orally 1 hour b/4 procedure.
- IV. Moderate-risk patients allergic to ampicillin/amoxicillin: Vancomycin 1 gm over 1-2 hours. Complete infusion within 30 minutes of starting the procedure.

EKGs to Recognize Immediately

1. Acute MI
2. Wolf-Parkinson White (Remember rate control with procainamide, definitive Rx is radio-frequency ablation of bypass tract)

Indications for CABG:

1. Severe 3V CAD
2. Left main CAD or Left main equivalent (proximal LAD) significant stenosis (with depressed LVEF per CASS- Coronary artery surgery study- database. This database also revealed that LV function appears to be the most important determinant of prognosis in patients with CAD).
3. Diabetics (Bypass Angioplasty Revascularization Investigation-BARI trial showed CABG was consistently superior to PTCA in pts. with diabetes).

VSDs and Heart Disease During Pregnancy

Ventricular Septal Defects: Small defects (a.k.a. maladie de Roger) often produce a loud holosystolic murmur but are of little or no clinical significance apart from the need for endocarditis prophylaxis. Defects can occur at many different areas in the septum, the most common being in the membranous or muscular parts of the septum. These defects have the possibility of closing spontaneously up to about age 20. Defects in other positions never close spontaneously (such as subaortic defects, subpulmonary defects, and A-V canal defects).

Small defects may be associated with a **thrill** at the left sternal border, usually in the fourth interspace. The murmur is usually **holosystolic**, but can be shorter if it is in the muscular septum because the defect may be occluded during late systole.

Large defects $Q_p:Q_s$ (pulmonic to systemic blood flow) >2, may produce a mitral diastolic flow rumble.

Moderate defects $Q_p:Q_s$ 1.5-1.9

Small defects $Q_p:Q_s$ <1.5

Selected athletes w/ a large VSD and no significant elevation in pulmonary vascular resistance can participate in some low-intensity sports. Pts. w/ small or moderate VSDs and no pulmonary hypertension can participate in **all** competitive sports. In general, individuals with **pulmonary vascular disease and pulmonary hypertension are at risk for sudden death** during intense athletic activities. As pulmonary vascular obstruction progresses, pts. with a shunt lesion develop cyanosis at rest, and intense cyanosis w/ exercise. Most of these patients limit their own activity.

Heart Disease During Pregnancy:

Maternal plasma volume begins to increase early in pregnancy and reaches its peak at 32 weeks, and then plateaus with a slight increment before term. The increase in plasma volume in a normal single pregnancy is 40-50% over pregestational levels. Most pregnant women experience some pedal edema. **Flow murmurs and S3 gallops are also common** and the jugular venous pressure increases. The increase in maternal plasma volume leads to a rise in cardiac output of 30-50% over pregravid levels. Remember both **mitral stenosis and secundum ASD** can present in the pregnant patient as new onset a-fib and pulmonary edema.

It is felt that maternal risk for both morbidity and mortality vary directly with the NYHA functional class. **Major contraindications to pregnancy include primary pulmonary hypertension and Eisenmenger syndrome.** In secundum ASD, aortic stenosis, and dilated cardiomyopathy, patients must be closely watched. In the latter two, patients are usually kept at bedrest. Secundum ASD pts. are usually not at risk for cardiac decompensation unless they develop A-fib.

A maternal rubella infection during pregnancy is a common cause of supravulvalr aortic stenosis, pulmonic stenosis, and other congenital cardiac defects.

Warfarin is contraindicated in pregnancy due to its teratogenic effects. It is absolutely contraindicated during the first trimester, though to be safe most physicians avoid it during the entire pregnancy. Remember also that low molecular heparin is **not** indicated for pregnancy (due to limited experience) and is also **not** indicated for use with prosthetic valves. Heparin, digoxin, quinidine, propranolol, calcium channel blockers, and electrical cardioversion are all acceptable during pregnancy. Though heparin is not contraindicated, it does cause increased morbidity and mortality in mother and child.