

Valvular Heart Disease in Pregnancy

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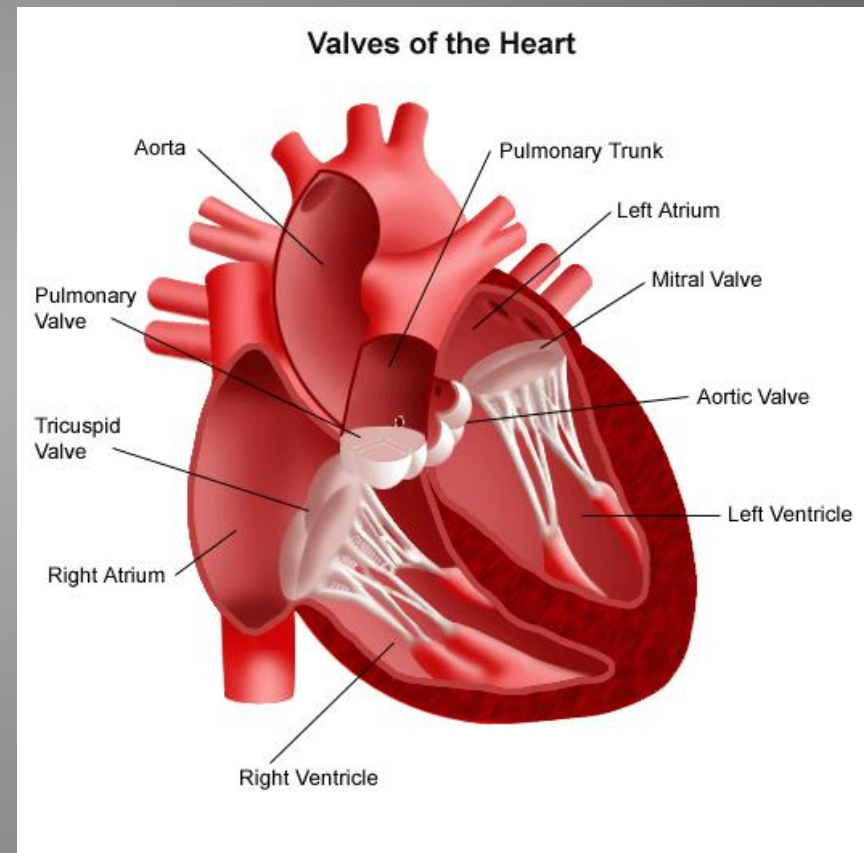
No Financial Disclosures

Objectives

- Discuss common valvular heart conditions in women of childbearing age
- Identify high risk valvular heart conditions during pregnancy
- Discuss management of common valvular heart conditions during pregnancy

Valves and Pregnancy

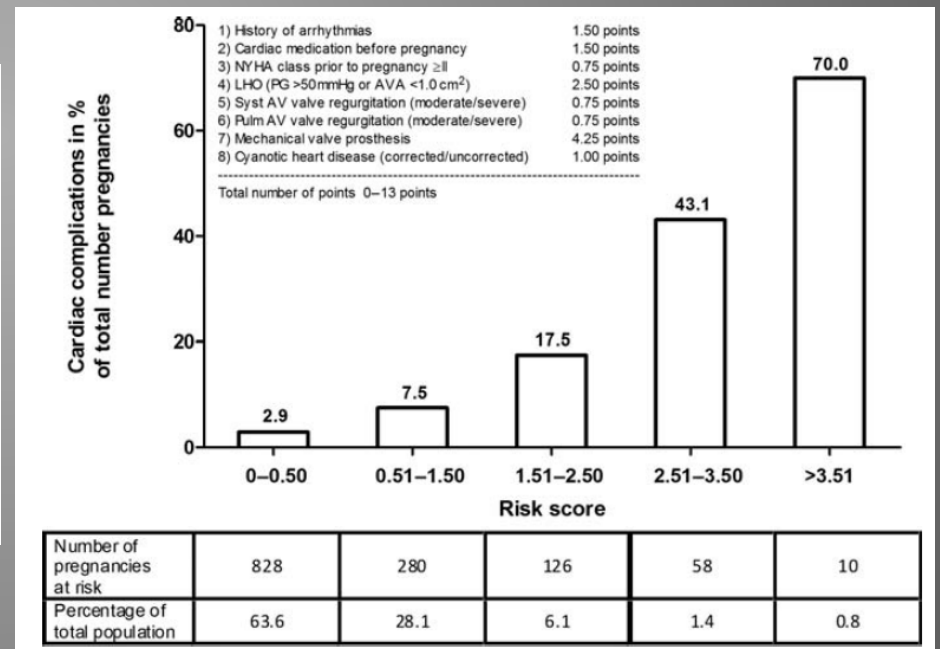
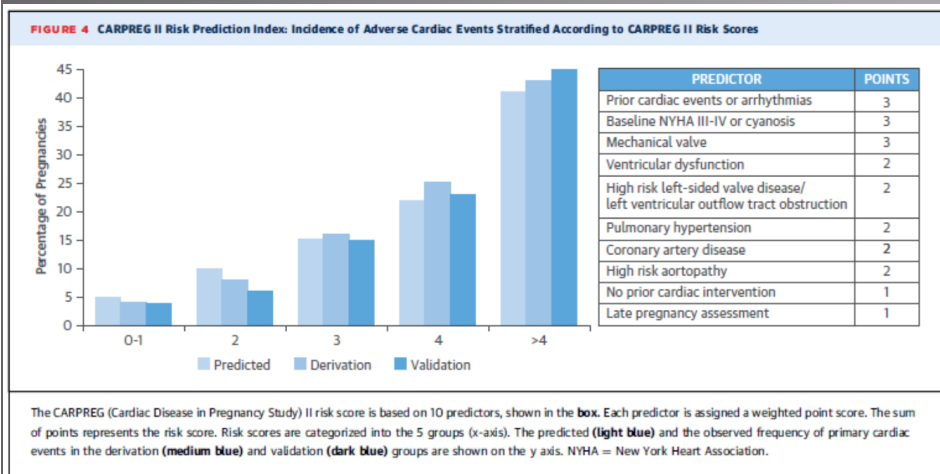
- In general L sided higher risk than R sided
- No medical cure
 - Can temporarily manage
- Per ACC/AHA guidelines, endocarditis prophylaxis is likely *unnecessary*



Risk Stratification

CARPREG II

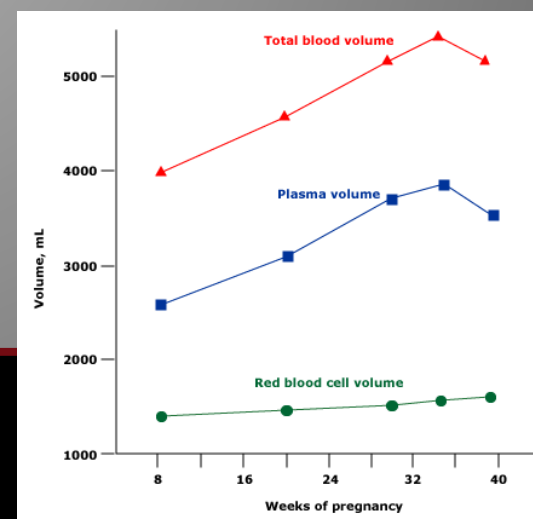
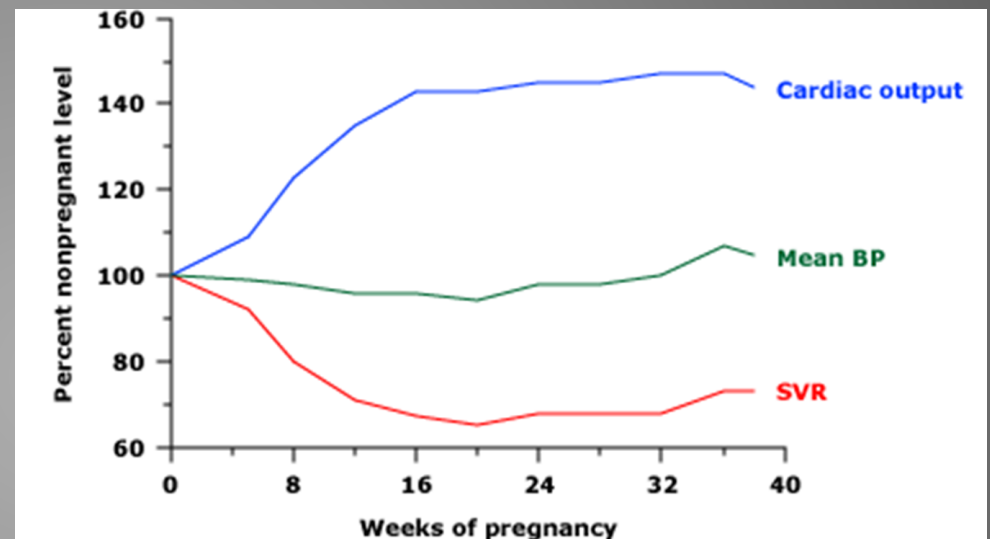
ZAHARA



WHO CLASS I	WHO CLASS II	WHO CLASS II-III	WHO CLASS III	WHO CLASS IV
No higher risk of maternal death than general population	Small increased risk of maternal death / complications	(May be classified as class II or III depending on individual)	Significant risk of maternal death/ complications. Requires expert CV and OB care	Pregnancy contraindicated; very high risk of maternal death or complications
Uncomplicated, small or mild lesions including pulmonary stenosis, VSD, PDA and MVP with no more than trivial MR	Un-operated ASD	Mild LV impairment	Mechanical valve	PAH of any cause
Successfully repaired simple lesions including ostium secundum ASD, VSD, PDA, TAPVD	Repaired Tetralogy of fallot	Hypertrophic CM	Systemic RV (ie L-TGA, D-TGA s/p Mustard or Senning)	Severe LV dysfunction (EF <30% or NYHA 3-4)
Isolated PVCs and PACs	Most arrhythmias	Marfan's without aortic dilation	Post Fontan operation	Previous peripartum cardiomyopathy with any residual impairment of LV function
	Coarctation of the aorta without significant gradient or aneurysm (repaired or unrepaired)	Heart transplant	Cyanotic heart disease	Severe left heart obstruction AVA < 1 cm ² or peak gradient >50 mmHg MVA < 1.5 cm ²
	Long QT syndrome	Native or tissue valve heart disease not considered WHO class 4	Other complex congenital heart repair	Marfan syndrome with aortic dilation >45 mm
		Bicuspid aortic valve without aortic dilatation	Aortic dilation with no known fibrinogen disease	Bicuspid AV with aortic dilation >50mm
			Coarctation of the aorta with residual gradient or aneurysm (repaired or unrepaired)	
			Marfan Syndrome with aortic root dilation <45 mm or s/p aortic replacement	
			Bicuspid AV with aortic root dilation 45-50mm	

Stenotic Lesions

- Generally poorly tolerated
- Increased CO and HR will increase pressure gradient
- Pre-load dependent lesions
- **Valve area will NOT change over 9 months ... but pressure gradient WILL!**



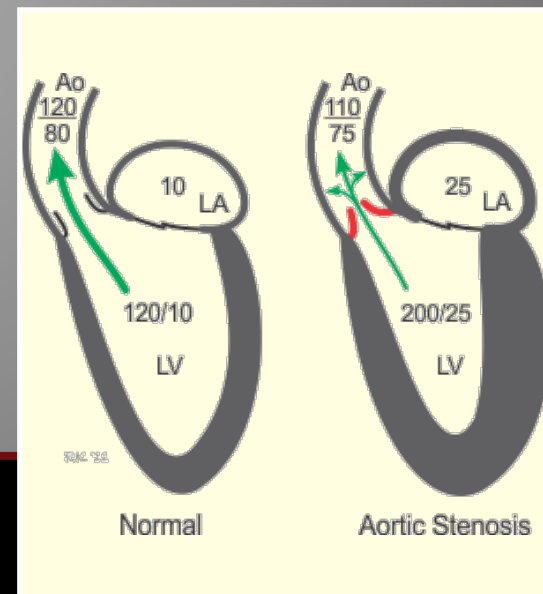
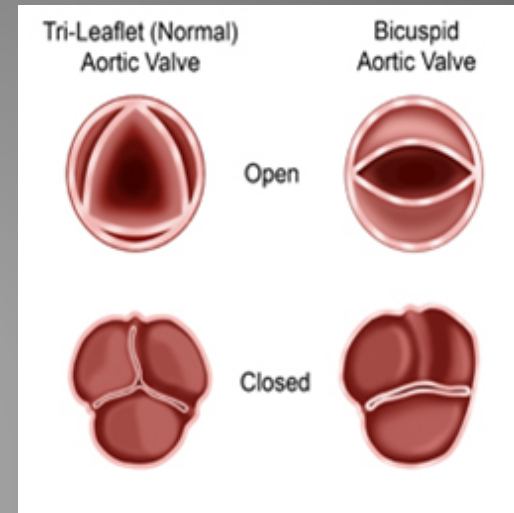
Regurgitant Lesions

- Generally well-tolerated
 - Volume overloading lesions
 - Pregnancy is already a volume overloaded state
 - Reduced SVR of pregnancy reduces regurgitation during pregnancy
- Afterload-responsive lesions
- Highest risk: Worsening regurgitation/
reversible heart failure post-partum or third trimester

Left Sided Obstructive Lesions

Valvular Aortic Stenosis

- Bicuspid Valve >>> Rheumatic
- Severe:
 - Peak gradient >64 mmHg
 - >50 mmHg per risk stratification tools
- Consider exercise testing in the asymptomatic patient



Bicuspid AV

- Most common congenital heart defect
- Increased risk for coarctation and aortic aneurysms
 - MRA for all patients
 - Aortopathy more likely to dictate severity of risk
- Risk for both AS and AI
- Surprisingly limited data...likely indicates low risk

Management of AS in Pregnancy

- Likely Complications:
 - Reversible CHF > Arrhythmia
- Symptom Management
 - Beta-blockade (reduce flow)
 - Diuretics as needed
 - Balloon valvuloplasty in select cases if necessary

Medication Safety

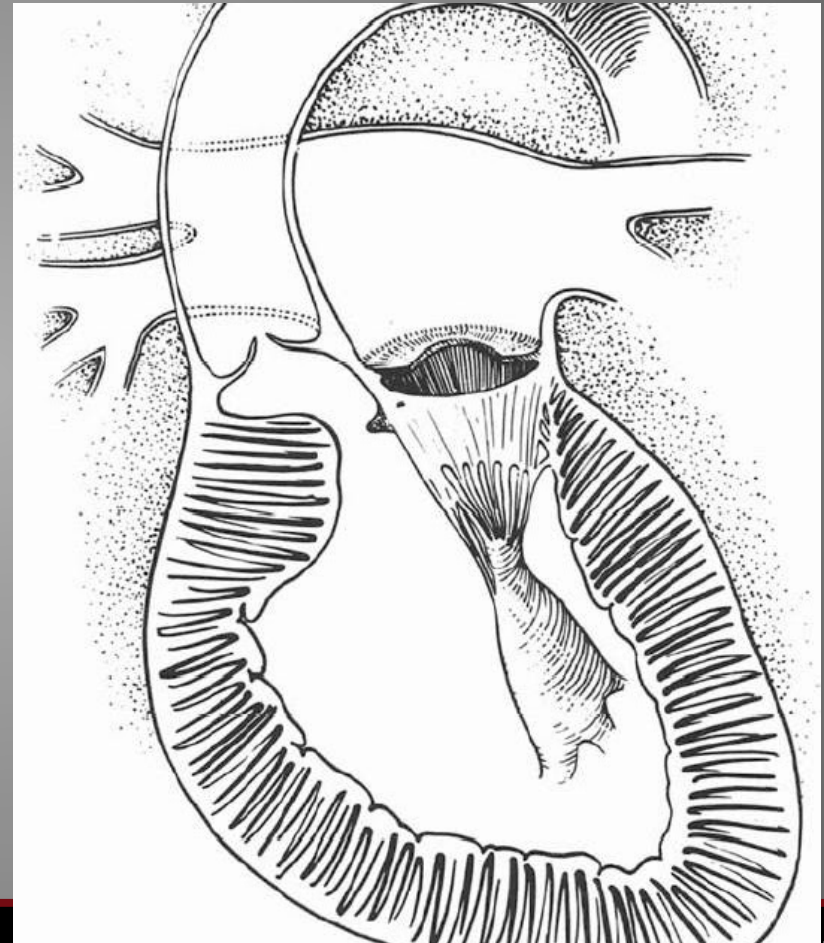
- Beta-Blockers
 - Exception: Avoid ATENOLOL
 - Preferred: Propranolol, Metoprolol, Nadolol, Labetalol
- Calcium Channel Blockers
 - Diltiazem, Nifedipine, Verapamil
- Diuretics - Furosemide
- Antiarrhythmics
 - Avoid AMIODARONE if possible
 - Sotalol, Flecainide, Quinidine, Procainamide
- Digoxin
- Adenosine
- Plavix
- Aspirin – 81 mg

Mitral Stenosis

- Etiology:
 - Congenital MS – Parachute MV/Shone Complex
 - Rheumatic Heart Disease
- Severe MS is very high risk lesion
- “Severe”:
 - MVA <1.5 by risk stratification tools
 - Mean gradient >10 mmHg
- Flow-dependent: gradients WILL increase with pregnancy
- Exercise testing can be useful

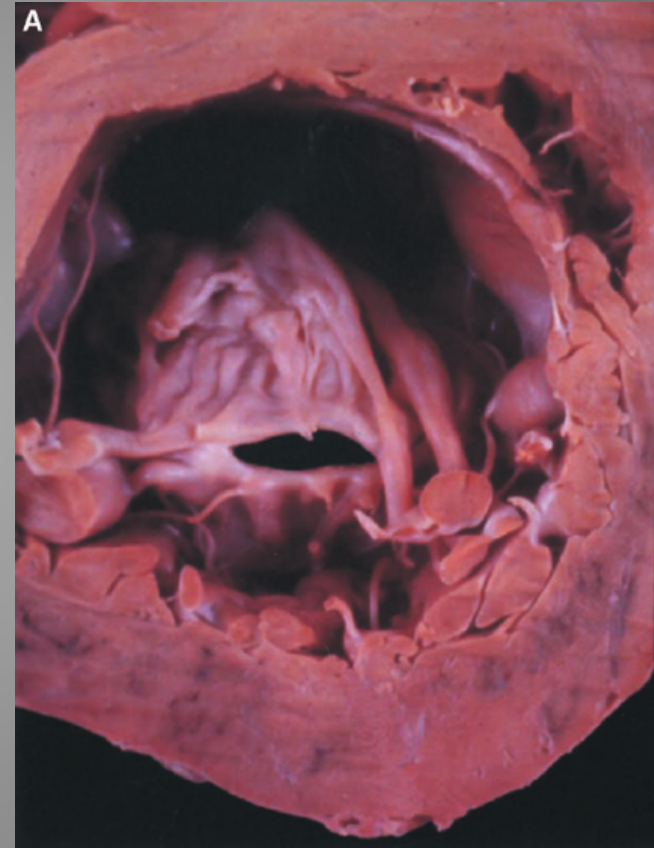
Shone Complex

- Serial L sided obstructive Lesions – at least 3
 - Parachute MV
 - Supravalvular mitral membrane
 - Subaortic Stenosis
 - Bicuspid AV
 - Coarctation



Rheumatic Heart Disease

- Decreasing in incidence
 - Immigrants/Refugees
- Calcification of mitral leaflet tips and chordae
- Mitral stenosis and regurgitation



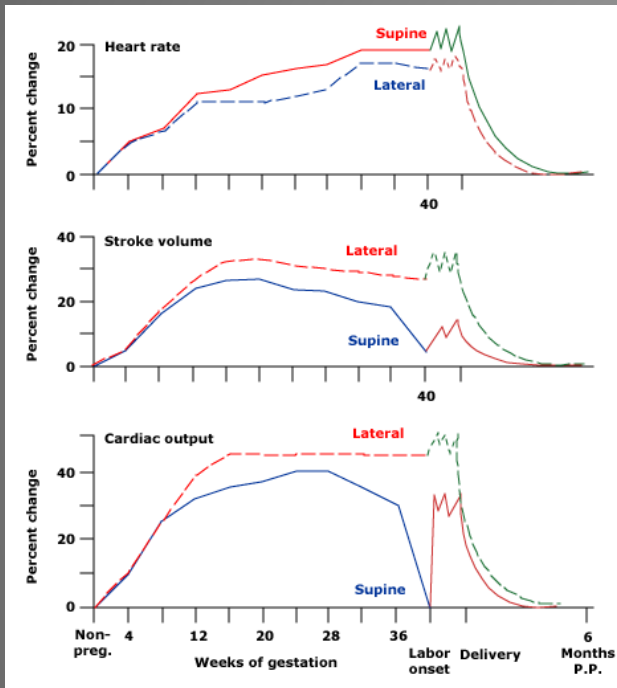
Complications of MS in Pregnancy

- Reversible CHF
 - Increased MV gradients → Pulmonary edema
- Atrial arrhythmias
 - LA enlargement → atrial fibrillation, SVT
- Thromboembolism
 - LA enlargement/afib → CVA

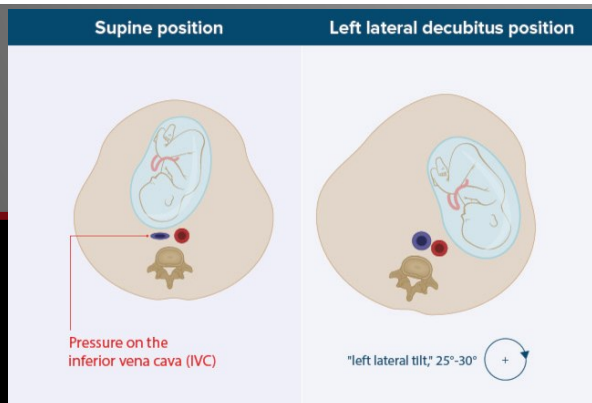
Management of MS in Pregnancy

- Frequent clinical and echo follow up
- Exercise restriction if symptomatic
- Beta-blockade (reduce flow) → reduce gradients
- Diuretics as needed
- Therapeutic Anticoagulation
 - If AF, LA thrombus, prior CVA, spontaneous echocontrast in LA, or LAVI >40 ml/m²
- Balloon valvuloplasty in select cases if necessary
 - NYHA III-IV patients with favorable anatomy
 - Second trimester

Delivery: Hemodynamics and Positioning



- Cardiac Output Increases
 - 30% during first stage
 - Up to 80% immediately post-partum
- 300-500 cc “autotransfusion” with each contraction
- Blood pressure increases with each contraction
- Post-partum increase in pre-load due to relief of IVC obstruction



Delivery with Left Sided Obstructive Lesions

- Pre-load Dependent
 - *ALSO risk for pulmonary edema
- Maintain euvolemia
- Early epidural
 - Slow titration, no bolus
 - Avoid spinal anesthesia
- Labor in left lateral decubitus position
- Assisted second stage vs. cesarean delivery

Post-Partum = THE WEEDS!



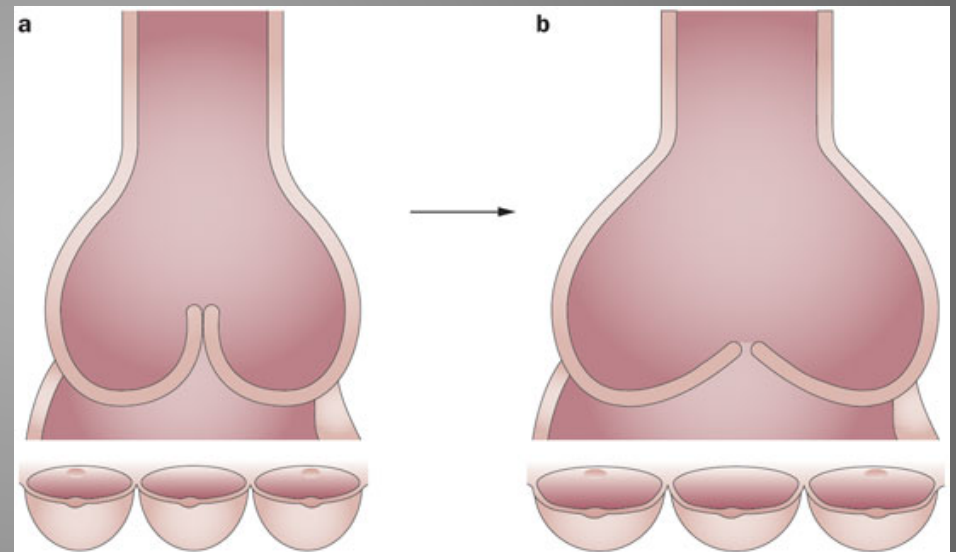
Postpartum Management

- Gradual return to baseline hemodynamics
 - 6 months for complete normalization
 - Most changes in first 2 weeks
- Reduced myocardial contractility
- Significant mobilization of fluid 24-72 hours after delivery
 - POST-PARTUM IS MOST COMMON TIME FOR CARDIAC COMPLICATIONS
 - Sickest patients should be monitored in ICU 48-72 hours
- Rule of Thumb – Never let a parturient leave the hospital unless she can lie flat

Left Sided Regurgitant Lesions

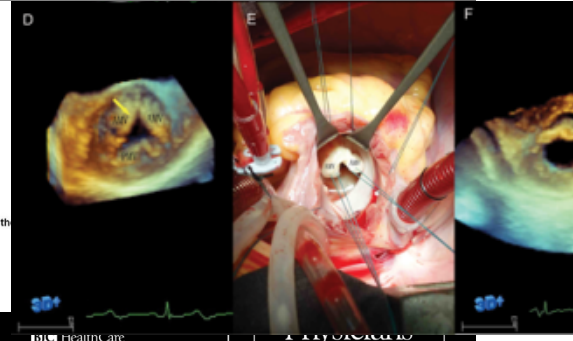
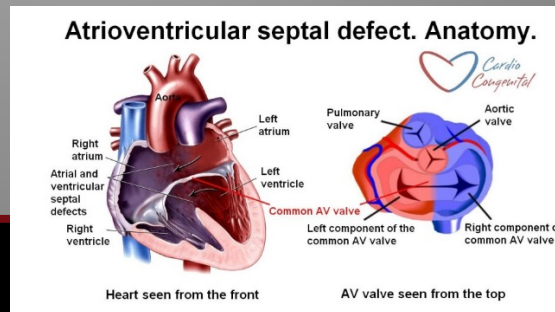
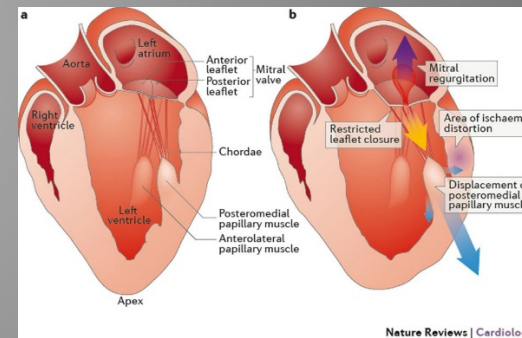
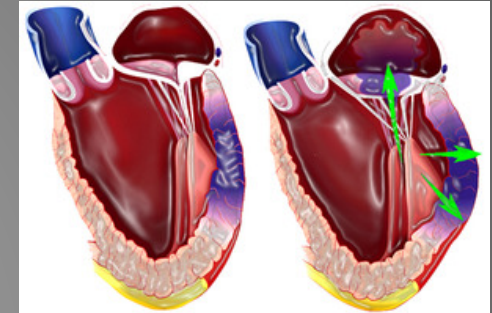
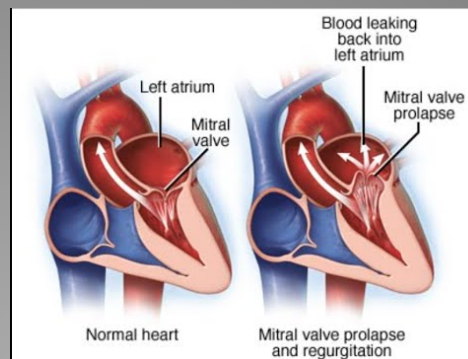
Aortic Regurgitation

- Etiology:
 - Bicuspid AV
 - Aortic root dilatation
 - Marfan, Loeys-Dietz, Ehler's Danlos
 - Prior endocarditis
- LV Volume Overload and Dilation
- Generally well-tolerated



Mitral Regurgitation

- Etiology:
 - Mitral Valve Prolapse
 - Ischemic
 - Functional
 - Cleft Mitral Valve
 - Prior endocarditis
- Generally well-tolerated
- Four chamber dilatation of pregnancy may transiently worsen MR



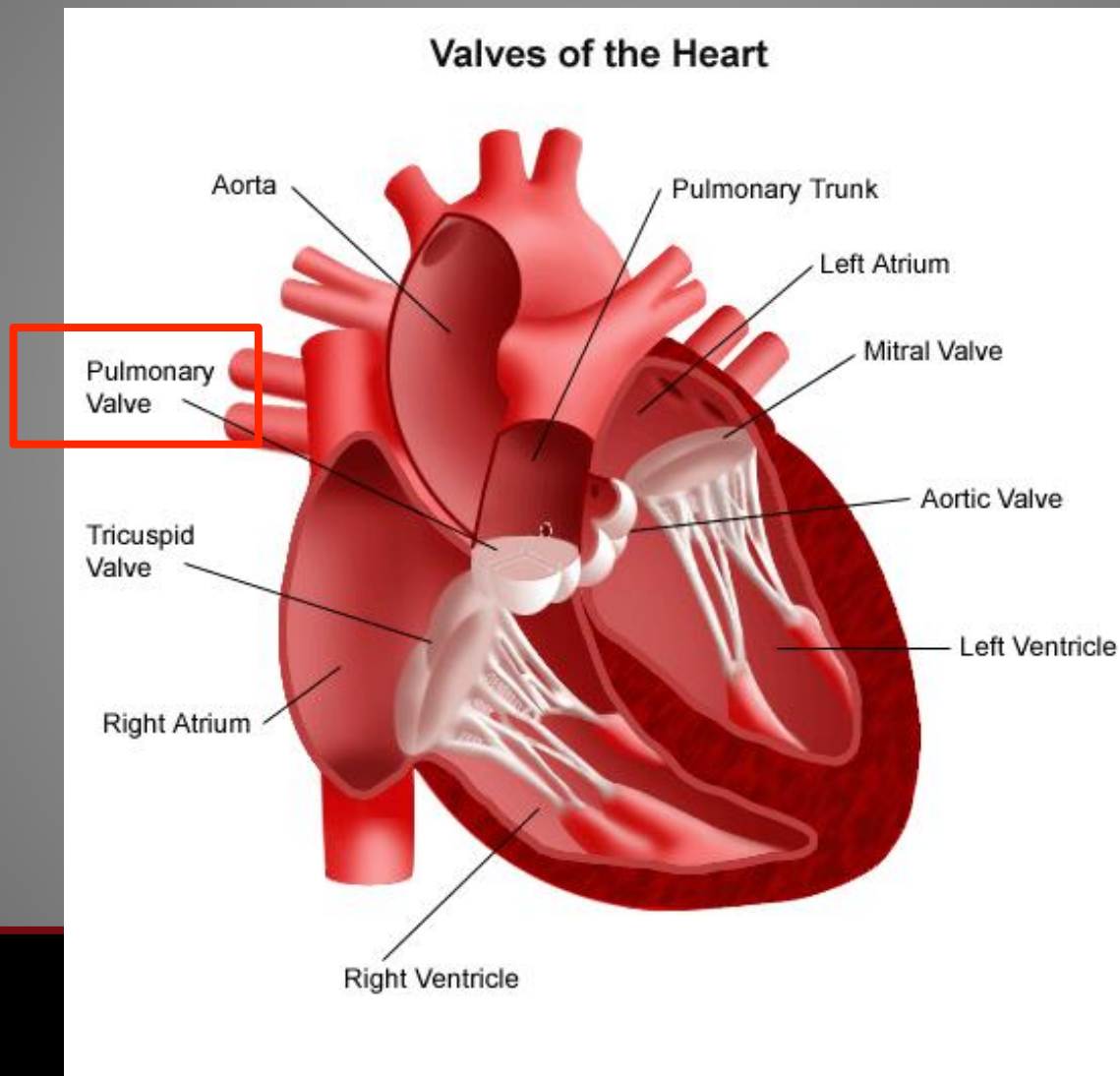
Management of Left Sided Regurgitant Lesions in Pregnancy

- Likely Complications:
 - Reversible CHF >> Arrhythmia
- Symptom Management
 - Afterload Reduction (hydralazine, nitrates)
 - Diuretics as needed

Delivery with Left Sided Regurgitant Lesions

- Afterload responsive
- Risk for pulmonary edema
 - Maintain euvolemia to slightly dry
 - Maintain afterload reduction
- No contraindication to vaginal delivery unless acute decompensated CHF
- ANTICIPATE VOLUME OVERLOAD 24-48 hours postpartum

Pulmonic Valve



Management of PS in Pregnancy

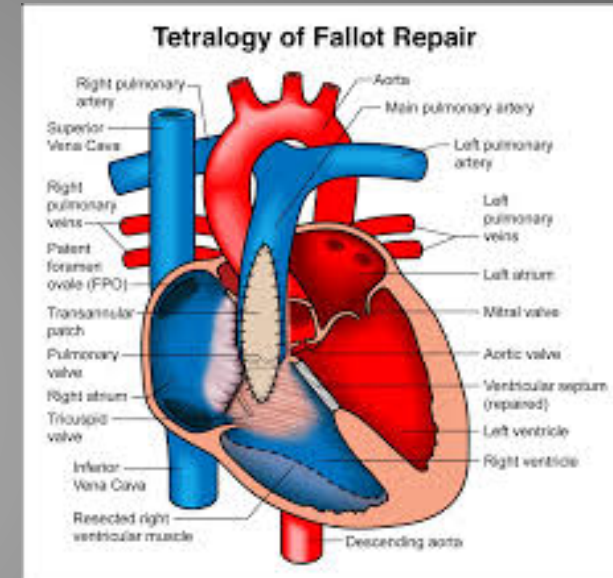
- Very well tolerated even if severe (peak gradient >60 mmHg)
 - Particularly if asymptomatic and normal RV
- ***Pulmonary stenosis ≠ Pulmonary HTN***
- Most common complications
 - Reversible RV failure, arrhythmias
- Symptom Management
 - PRN diuretics, beta-blockade
- Balloon valvuloplasty unlikely to be needed

Delivery in Severe PS

- Pre-load Dependent
- Maintain adequate hydration
- Early epidural
- Labor in left lateral decubitus position
- Assisted second stage
- May need gentle diuresis 24-48 hours postpartum

Pulmonic Regurgitation

- Etiology:
 - Tetralogy of Fallot
 - Tetralogy of Fallot
 - Tetralogy of Fallot
 - Prior valvotomy for PS
- RV Volume Overload and Dilation
- Generally well-tolerated – can eventually lead to RV failure



Management of PI in Pregnancy

- Likely Complications:
 - Generally well-tolerated
 - Pre-pregnancy NYHA and RV function can help gauge risk
 - Reversible Right sided CHF, Arrhythmia
- Symptom Management
 - Diuretics as needed
 - Digoxin/inotropes if severe RV dysfunction

Delivery in Severe PI

- Epidural
- No contraindication to vaginal delivery unless acute decompensated CHF
- May need gentle diuresis 24-48 hours postpartum
- If severe RV dysfunction, consider temporary dobutamine for RV support

Prosthetic Valves in Pregnancy

- Bioprosthetic
- Mechanical
- Ross Procedure
- Valvular Repairs
- Prior valvuloplasty/valvotomy

Bioprosthetic Valves

- Last 10-20 years
 - Patients will likely need another valve intervention in lifetime
 - ?Accelerated valve degeneration with pregnancy
 - Prone to stenosis and regurgitation
- ASA for thrombus prevention
- No need for IE prophylaxis with delivery
- Low risk for complication with pregnancy/delivery

Mechanical Valves in Pregnancy

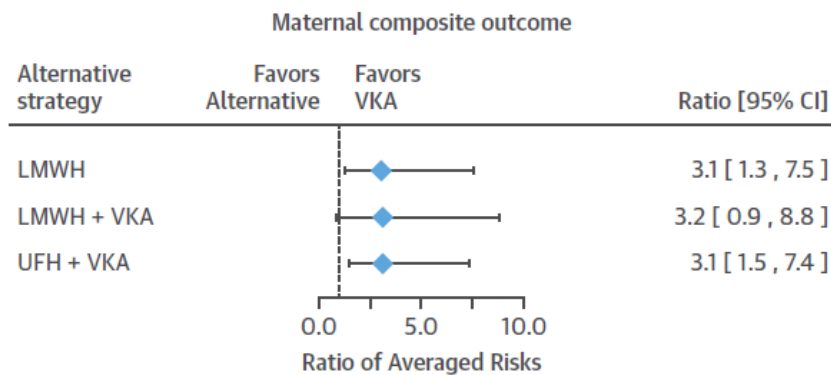


Mechanical Valves in Pregnancy

- WHO Class III
- High risk of bleeding AND thrombosis
 - Pregnancy and post-partum are MARKEDLY hypercoagulable periods
- Teratogenic risk of Warfarin
- Concerns about inadequacy of LMWH
- Thrombosis risk: TV>MV>PV>AV
 - Increased with ventricular dysfunction, afib

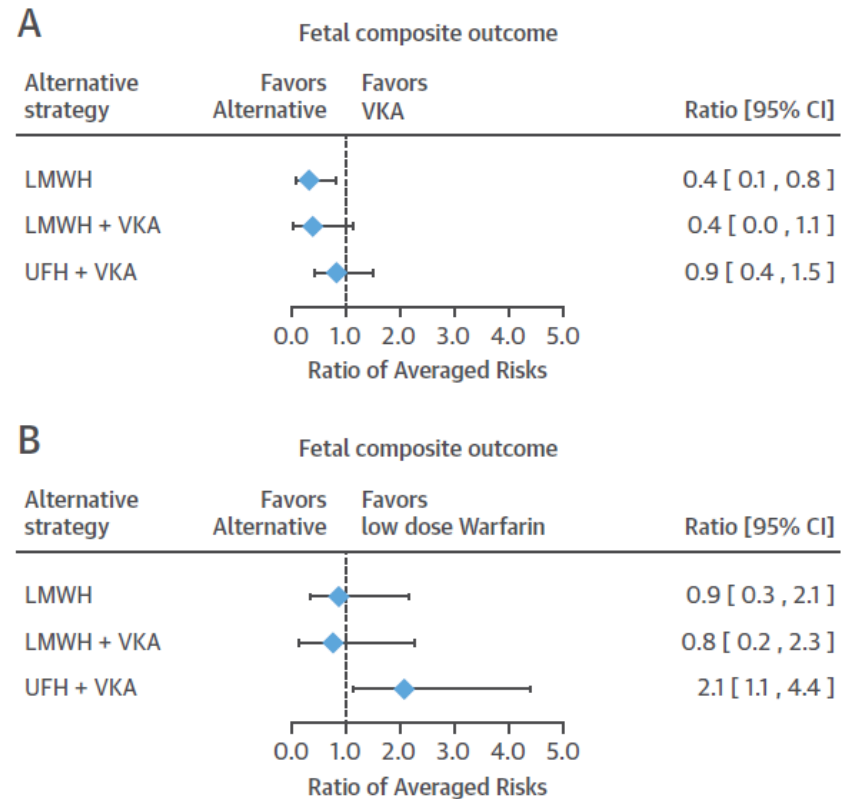
Mechanical Valves

FIGURE 4 Maternal Composite Outcome



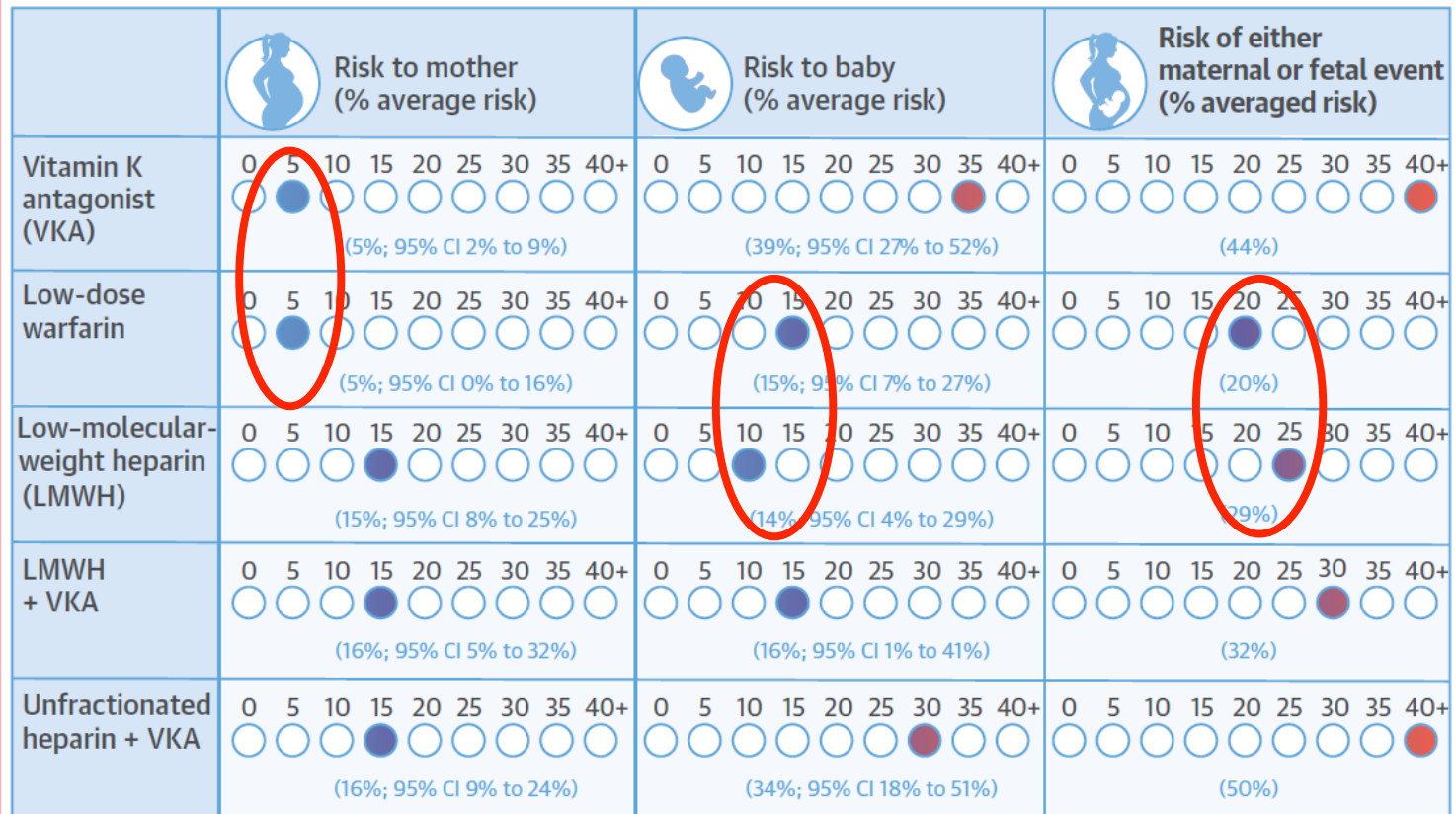
Ratio of the meta-analytic averaged risk for the maternal composite outcome between a VKA regimen and each alternative regimen. Abbreviations as in Figures 1 and 2.

FIGURE 5 Fetal Composite Outcome



Mechanical Valves

CENTRAL ILLUSTRATION Anticoagulation Strategies in Pregnant Women With Mechanical Heart Valves



Steinberg, Z.L. et al. J Am Coll Cardiol. 2017;69(22):2681-91.

Washington
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Physicians

BIO HealthCare

NATIONAL LEADERS IN MEDICINE

Anti-Xa Monitoring

- Typically follow peak levels once weekly
 - Increased volume of distribution
 - Increasing weight
 - Increased renal clearance
- Lack of evidence regarding:
 - Peak vs trough monitoring
 - Ideal therapeutic levels
 - Ideal measurement intervals

Anticoagulation Recommendations

- Continue warfarin throughout pregnancy if maintenance dose ≤ 5 mg/day
- Alternatively substitute weight based lovenox weeks 6-12
 - Weekly peak anti-Xa level monitoring
 - Goal 1.0-1.2
 - ? Weekly trough anti-Xa level >0.6

Delivery with Mechanical Valves

- Planned delivery
- Switch from warfarin to IV heparin or LMWH at 36 weeks
 - UFH – aPTT >2x control
 - Anti-Xa level 1.0-1.2
- Switch from LMWH to UFH 36 hours prior to delivery*
 - Hold heparin 4 hours prior to delivery
 - Resume 6-12 hours after delivery
 - Resume warfarin evening of delivery
 - Aspirin during labor/delivery
- If delivery occurs while on warfarin → cesarean
 - Warfarin crosses placenta → intracranial hemorrhage

Contraception

- Women with heart disease should receive counseling on contraception
 - PLANNING pregnancy for lower-risk patients
 - PREVENTING pregnancy for highest-risk patients
- Many women do not recall discussing with their cardiologist
- Others recall inaccurate information

Vigl, M., et al. (2010). "Contraception in women with congenital heart disease." [Am J Cardiol 106\(9\): 1317-1321.](#)

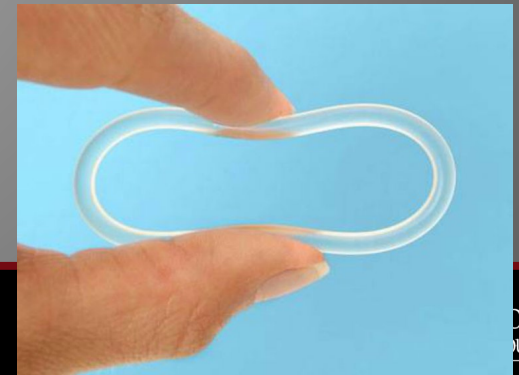
Kovacs, A. H., et al. (2008). "Pregnancy and contraception in congenital heart disease: what women are not told." [J Am Coll Cardiol 52\(7\): 577-578.](#)

Contraception

- Is it safe?
- Does it work?

Safety Concerns

- Combined hormonal methods
 - Pill, patch, and ring
 - Associated with increased risk of thromboembolism
 - Absolute or relative contraindication in some cardiovascular conditions



WHO COC Risk: Contraindications

- PHTN or Fontan Palliation
- Atrial Fibrillation
- Mechanical Valves
- R to L Shunt
- Coronary or Aortic Diseases
- Previous Thromboembolism
- LV Dysfunction
- Hypertension (relative)

Tiers of Contraceptive Effectiveness

- I – Failure Rate <1%
 - Permanent sterilization
 - Long Acting Reversible Contraception (LARC)
- II – Failure Rate 6-12%
 - Combined Hormonal Contraceptives
 - Progestin Only Contraceptives
- III – Failure Rate 12-24%
 - Barrier methods
 - Withdrawal
 - Fertility awareness methods
- None – 85% pregnancy rate within 1 year

Long Acting Reversible Contraception

- 3 Options:
 - Levonorgestrel impregnated IUD
 - Mirena, Skyla, Liletta, Kyleena
 - Copper IUD
 - Etonogestrel impregnated rod
- More effective than tubal ligation
- Estrogen-free
- Completely reversible
- FDA approved for 3 to 10 years



Recommendations: Contraception for Women with Heart Disease

- Method of contraception assessed and documented annually
- Long acting reversible contraception should be preferred method for:
 - WHO Class III-IV
 - All patients taking potentially teratogenic medications

Thank You!!

