



Maternal Cardiac Disease In Pregnancy

August 25, 2017
PREGNANCY ECHO CONFERENCE



Maternal Physiology

Cardiac Output = HR x SV

Non-pregnant: 4.5 L/min

Pregnant: 6.0 L/min

Increase most acute in first 10 weeks

(increase in SV: 10cc to 75 cc, blood volume: 50%)

Gradual increase to 24 weeks then plateau

(increase in HR)

Uterus: first trimester 3% CO

third trimester 17% CO



Maternal Physiology

LABOR: Increase CO by additional 40% pain
(regional anesthesia mitigates increase)

contractions (autotransfusion 300-500 cc)

elevated BP

POST PARTUM: 10-20% increase CO

autotransfusion from contracted uterus

relief of IVC compression

followed by rapid diuresis

Maternal Hemodynamics

	Non-Pregnant	Term Pregnancy
Cardiac Output	4.3 L/min	6.2 L/min
Heart Rate	71 bpm	83 bpm
SVR	1530 mmHg	1210 mmHg
PVR	119 mmHg	78 mmHg
Colloid Oncotic Pressure	21 mmHg	18 mmHg
MAP	86	90
PCWP	6.3	7.5
CVP	3.7	3.6



Types of Cardiac Disease

Congenital

The majority of patients seen

Survival of children with CHD

Rheumatic Heart Disease

Increasingly rare in developed countries

Peripartum Cardiomyopathy



In General . . .

Pregnancy has a favorable maternal and fetal outcome in patients with congenital heart disease.



EXCEPTIONS . . .

Severe Mitral Stenosis / Aortic Stenosis

Pulmonary Hypertension

Peripartum Cardiomyopathy

Beware

Signs of worsening heart disease may be interpreted as “normal pregnancy”

Increase HR, dyspnea, decrease exercise tolerance, edema, JVD, murmurs

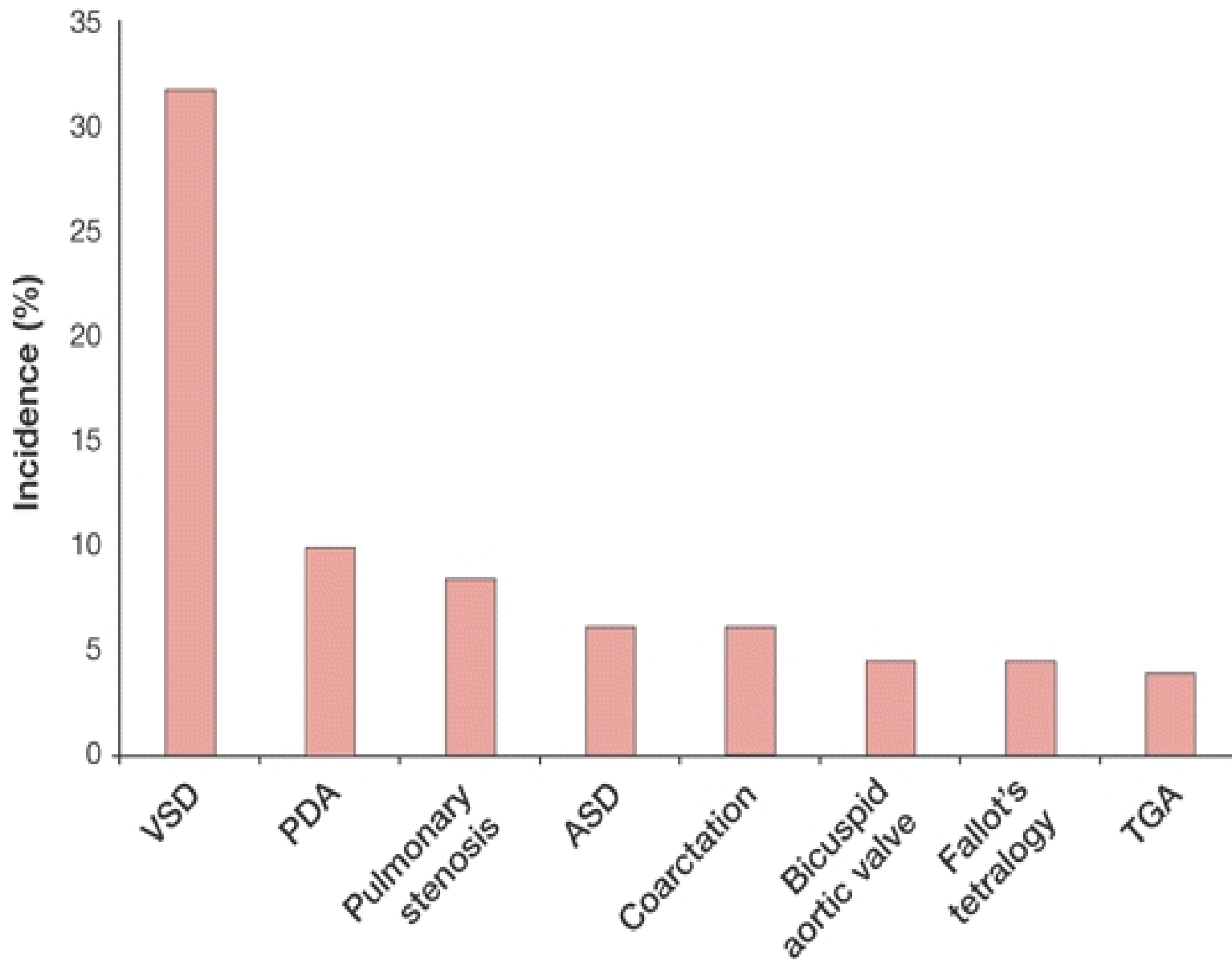
Atypical: chest pain, orthopnea, arrhythmias

Beware

“Corrected” congenital heart disease

Almost always some “residual disease”

Risk of arrhythmias and decreased LV fxn.





Low Risk Lesions (<1%)

ASD	Mild AS	MVP	Mild / mod PS
VSD	Mild AR	MR	Repaired non-cyanotic ****CHD****
PDA		Mild / Mod MS	



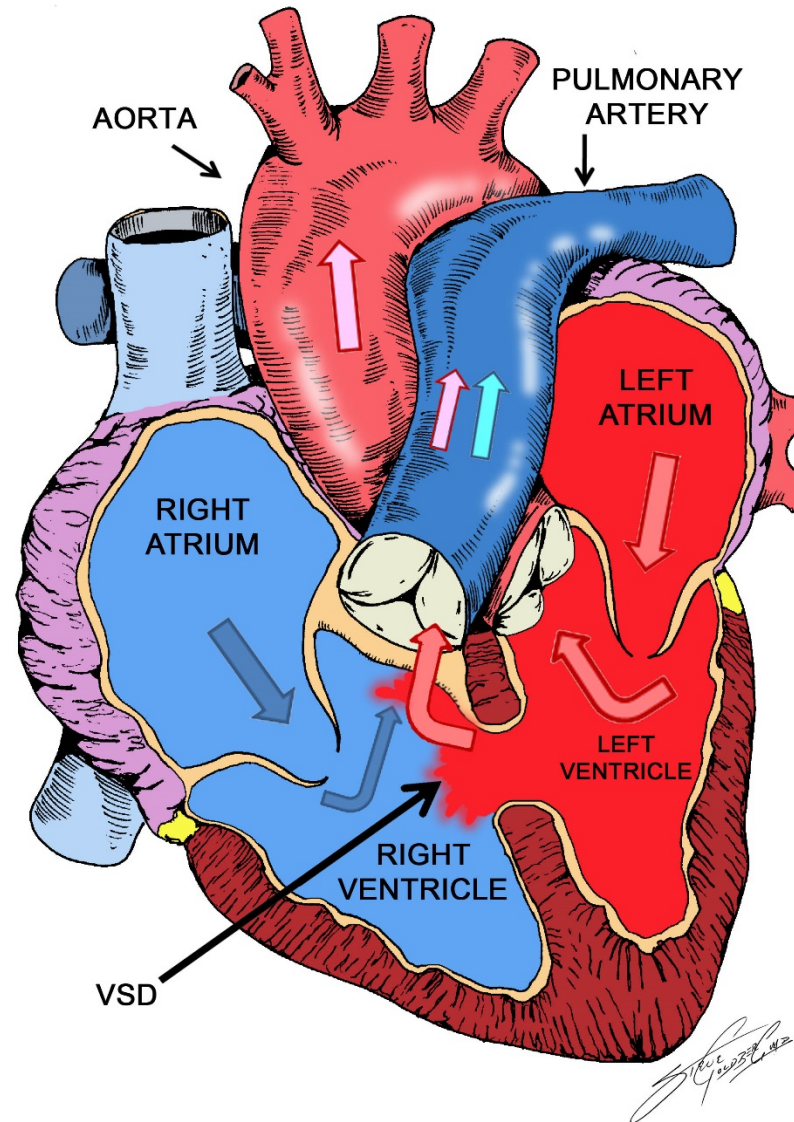
Left to Right Shunts

- VSD, ASD, PDA
- Back leak of blood from systemic to pulmonary circulation
- Increase in CO balanced by decreased PVR
- Promotes systemic (forward) flow
- Pregnancy, Labor, post partum well tolerated



Left to Right Shunts

- EXCEPT:
- If there is large shunt
 - pulmonary HTN
 - Arrhythmias
 - ventricular dysfunction





Labor Management

Avoid HTN to promote systemic flow.

Fluid balance: avoid fluid overload



Moderate Risk Lesions (10%)

Large left-right shunt	Moderate AS	Moderate MS	Severe PS
Prior MI	Coartation of Aorta		
Uncorrected Tetraology of Fallot	Marfans Syndrome (normal ao)		

High Risk Lesions (25-50%)

Severe pulmonary HTN

Eisenmenger's Syndrome (prolonged L-R shunt)

Complex cyanotic cardiac dz

Marfan Syndrome with aortic root >4.5 cm

Severe AS or MS

NYHA class III-IV

Prior peripartum cardiomyopathy



Eisenmenger / Pulmonary HTN

Consider pregnancy termination, but is not without risks

Oxygen, pulmonary vasodilating drugs, limit activity

Assisted second stage better outcomes than C/S



Marfan Syndrome

Autosomal Dominant Inheritance

Genetic counseling imperative

Aortic dissection / Rupture

SAB / SPTB

Prophylactic replacement of aortic root >4.0 cm

Beta Blockers (HR and BP)

If dilated root c/s recommended.



LV Outflow Obstruction

- Aortic Stenosis (bicuspid valve)
- Mild – moderate well tolerated
- Severe (aortic valve area < 1.0 cm)
 - 10% risk of maternal morbidity
 - Mortality rare
 - Ideally valve correction prior to pregnancy



LV Outflow Obstruction

Labor and postpartum:

IVF management. Increased fluid volume

Avoid hypoperfusion of coronary vessels

MI

Peripartum Cardiomyopathy

IDENTIFY THE PHENOTYPE (>36 wks)

idiopathic

viral

hypertension

CHD

Prognosis for future pregnancies depends on return of LV fxn. $EF < 40\% = 50\%$ mortality rate



SBE Prophylaxis

“SBE prophylaxis is not recommended for NSVD or C/S in the absence of infection, except possibly for the small subset of patients at highest potential risk for adverse cardiac outcomes who are undergoing vaginal delivery”

Joint statement from AHA and ACC



Heart Transplant

Acute / chronic rejection not increased
(watch medication levels)

Prednisone, cyclosporine, azathioprine

Risks: infection PTB, low birth weight,
preeclampsia

C/S for obstetric indications

Risks highest immediate post partum

Arrhythmias / sinus tachycardia (surgical
trauma/ ischemia / loss of vagal nerve)



SBE Prophylaxis

SBE prophylaxis be considered in the highest risk patients

- Cyanotic cardiac disease
- Prosthetic valves

SBE prophylaxis administered 30-60 minutes before anticipated delivery



SUMMARY

Counseling is crucial

Maternal, fetal, inheritance, recurrence

Multidisciplinary approach

Understand basic physiology of pregnancy

Understand basic physiology of lesions

Do NOT underestimate low risk lesions and
“repaired” lesions

Cesarean section not always better option

Pregnancy termination poses risks