CONTRACEPTION: WHICH AGENT AND FOR WHOM

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CASES

32 yo with history of PPCM; Lost to follow up and heart failure medications discontinued. Presented to Catholic hospital with NYHA Class 4 ADHF at 20 weeks gestation. EF 20-25% transferred to our hospital for pregnancy termination for maternal indications

39 yo with history of lupus associated cardiomyopathy; s/p AICD placement 2013. HF meds discontinued by her ob when she presented with pregnancy out of concerns for teratogenecity. Admitted to outside hospital at 18 weeks gestation with ADHF. EF <20%; seen in my clinic at 21 weeks. States she can feel baby moving and despite having been advised to terminate wishes to continue until “viable”
CASES

25 yo with hx of PPCM seen at outside hospital at 19 weeks gestation into an unplanned pregnancy. She has gained > 50#, notes edema and shortness of breath with exertion. BMI is 52. LV EF is 60-65% but she is concerned about recurrence and desires termination. Conservative measures unsuccessful and she under goes labor for delivery.

None of these patients were on birth control

How did we get into this pickle?
CARDIAC DISEASE PREGNANCY: WHAT WOMEN AREN’T TOLD

Guidelines for care of adults with GUCH recommend proactive counseling for contraception and pregnancy

ESC guidelines cardiac disease pregnancy recommend estimation of risk and pre-pregnancy counseling

Thorne S et al. Heart 2006; Therrien J et al. 2001; Regitz-Zagrosek et al. 2011
UNINTENDED PREGNANCY

In the US almost 49% of pregnancies unintended

Women with chronic diseases over age 20 were more likely to report that pregnancy was unintended rather than women without chronic disease

Finer LB et al. Perspect Sex Reprod Health 2006; 38, 90. Chor et al 2010 Contraception
WHAT WOMEN AREN’T TOLD

100 women with CHD 2013-2014
75.9% sexually active
Many had discussed options with an OB, but < half with their cardiologist
33% had had an unplanned pregnancy
49% misclassified their cardiovascular risk classification

Lindley, KJ et al Obstet Gynecol 2015; 126:363
Kovacs AH et al. 2008 JACC: 52 577
## WHO PREDICTORS: MATERNAL CARDIOVASCULAR RISK

<table>
<thead>
<tr>
<th>Risk Class</th>
<th>Pregnancy Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>No detectable increased risk mortality/mild increase in morbidity</td>
</tr>
<tr>
<td>II</td>
<td>Small increased risk maternal mortality and moderate increase in morbidity</td>
</tr>
<tr>
<td>III</td>
<td>Significant increased risk of maternal mortality or severe morbidity. Expert counseling required. Intensive specialist cardiac and obstetric monitoring needed throughout pregnancy and peripartum</td>
</tr>
<tr>
<td>IV</td>
<td>Extremely high risk of maternal mortality or severe morbidity. Discuss termination. If pregnancy continues care as in class III</td>
</tr>
</tbody>
</table>

Thorne S et al. Heart 2006 92: 1520-1525
WHO CLASSIFICATION FOR CONTRACEPTIVE METHOD BY CARDIAC CONDITION

<table>
<thead>
<tr>
<th>WHO Class</th>
<th>Contraceptive method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Always usable</td>
</tr>
<tr>
<td>2</td>
<td>Broadly usable</td>
</tr>
<tr>
<td>3</td>
<td>Caution in use</td>
</tr>
<tr>
<td>4</td>
<td>Do not use</td>
</tr>
</tbody>
</table>
LOWER RISK LESIONS

Small shunts

Repaired simple lesions
(ASD/VSD/PDA/anomalous PV)

MVP without significant MR

Mild pulmonic stenosis

PACs or PVCs Isolated

MODERATE RISK

Unrepaired > mild shunts
Repaired Tetralogy of Fallot
Most arrhythmias
Mild LV dysfunction
Hypertrophic cardiomyopathy
Native valve disease not mild nor severe
Milder aortic root disease
  • Marfan without dilatation
  • Bicuspid AoV with aortic root < 4.5 cm
  • Repaired coarctation

HIGHEST RISK LESIONS

Myocardial infarction
Mechanical valve
Complex CHD
  • System RV
  • Fontan circulation
  • Other
Aortic Dilatation
  • Marfan 40-45 mm
  • Bicuspid AV 45-50

NYHA class III or IV symptoms*
Severe pulmonary hypertension*
Significant LV dysfunction*
Severe aortic or mitral stenosis*
Severe coarctation*

*PREGNANCY CONTRAINDICATED

ISSUES IN CHOOSING

Efficacy
Convenience
Duration of action
Reversibility
Effect on uterine bleeding
Cost
Protection against STDs
Noncontraceptive benefits
Noncontraceptive risks
WHAT METHODS ARE THERE?

**METHOD EXPLORER /**

<table>
<thead>
<tr>
<th>most effective</th>
<th>party ready</th>
<th>STI prevention</th>
<th>hormone free</th>
<th>easy to hide</th>
<th>do me now</th>
</tr>
</thead>
</table>

*We’re talking real world effectiveness, not clinical trials.*

Image: Bedsider
HOW WELL DOES BIRTH CONTROL WORK

⭐⭐⭐⭐⭐ Really, really well
- The Implant (Nexplanon)
- IUD (Skyla)
- IUD (Mirena)
- IUD (ParaGard)
- Sterilization, for men and women

Works, hassle-free, for up to...
- 3 years
- 3 years
- 5 years
- 12 years
- Forever

Less than 1 in 100 women

⭐⭐⭐⭐⭐ O.K.
- The Pill
- The Patch
- The Ring
- The Shot (Depo-Provera)

For it to work best, use it...
- Every week
- Every month
- Every 3 months

6-9 in 100 women, depending on method

⭐⭐⭐ Not as well
- Pulling Out
- Fertility Awareness
- Diaphragm
- Condoms, for men or women

For each of these methods to work, you or your partner have to use it every single time you have sex.

12-24 in 100 women, depending on method

Image: Bedsider
WHAT ARE THE BIG CV RISKS?

Thrombotic complications
Risk factor modification: BP, lipids, dm, obesity
Progression of CV disease
Arrhythmic
Bleeding
Fluid retention
Bacteremia/endocarditis risk
THROMBOTIC RISKS

Metanalysis of 10 studies showed doubling MI risk

Largest study in Denmark 1.6 million women, 14 million years of follow up
RR stroke and MI risk increased

Venous thrombotic risk increased 2-4 fold

Increased risk for patients with shunts, complex CHD, arrhythmia, CAD risk

Estrogen Effects

- ↑ coagulation factors
- ↓ platelet aggregation

Progestin Effects

- ↑ coagulation factors
- ↓ platelet aggregation
- ↓ nitric oxide**

Lidegaard O et al. NEJM 2012; 366:2257
Baillargeon JP et al. JClinEndocrinolMetab 2005; 90: 3863
Shufelt CL et al. JACC 2009;53:221
ARRHYTHMIA RISKS

Estrogen can modify potassium channels
Women with long QT Type 2 at increased risk post partum
EP arrhythmia induction easier at certain times in cycle
Post menopausal women on HRT estrogen ↑ QT interval and progesterone ↓ QT interval

No studies: theoretical concern for women with significant arrhythmias

Sedlak, T et al J Womens Health 2012, 21:933
Shufelt CL et al. JACC 2009;53:221
Seth R et al. JACC 2007: 49: 1092
EFFECTS ON CAD RISK FACTORS

Depends on agent and route of administration

Blood pressure: most studies increase in systolic BP 7-8 mm

Some of the newer progestins have antimineralocorticoid diuretic effects and lead to small decrease in BP

Lipids: Dose related response LNG OCP: ↓ HDL cholesterol, ↑ LDL and TG

Glucose tolerance: no change in FBS but decrease in glucose tolerance

Women with multiple risk factors, established CAD, uncontrolled hypertension may be poor candidates
SUBSEQUENT RISK OF CVD

Majority of studies suggest no increased risk in past users

Shufelt CL et al. JACC 2009;53:221
Merz, NB et al Fertil steril 2006; 85: 1425
Stampfer, MJ et al NEJM 1988; 319: 1313
Both estrogen and progesterone can interfere with warfarin metabolism. Need to follow INR.

IM injection with DMPA has theoretic risk of hematoma formation

No data on subdermal implants: theoretical risk of hematoma formation

Anticoagulated women at risk for heavy menstrual bleeding. Women may benefit from agents which reduce menstrual flow or induce amenorrhea.
MORE CONSIDERATIONS

Endocarditis risk: BE prophylaxis no longer recommended
Fluid retention: from steroid component
SPECIAL CIRCUMSTANCES: PULM HTN

High mortality whether primary or secondary

Concerns: thrombogenic, bleeding, vasovagal reaction

Bosentan

- teratogenic
- interacts with estrogens and several of the progestins
- reduced efficacy with sc implant, POP

DMPA may be the safest and most effective

LNG-IUD does not interact but potential concerns about vasovagal reaction with insertion

use additional protection
CATEGORY 4: CONDITIONS FOR CHCS

Smoking
Multiple risk factors for CAD
Uncontrolled hypertension
DVT/PE
Ischemic heart disease
Valvular HD associated with pulm htn, afib, SBE
PPCM
DM associate with vascular disease or prolonged duration
Complex CHD/Fontan
APPROACH

Review medically eligible methods, emphasize the most effective
Discuss future pregnancy plans
Consider adherence behavior
Weigh noncontraceptive benefits/bleeding profiles
Assess need for dual protection
Ensure woman not pregnant

The **BEST** method for any woman is the most effective method that is safe for her and that she will use consistently
KEY POINTS

Cardiac disease leading cause of maternal mortality
Pregnancy may be life threatening
There are safe and effective contraceptive methods for each condition
Appreciate the need to refer high risk women for pre-pregnancy counselling
Offer appropriate contraceptive advice
THANK YOU!
## LOW RISK LESIONS

<table>
<thead>
<tr>
<th>Condition</th>
<th>CHC</th>
<th>POP</th>
<th>Injection</th>
<th>Implant</th>
<th>LNG-IUD</th>
<th>Cu-IUD</th>
<th>1° Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small shunts</td>
<td>Varies</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Thrombogenic</td>
</tr>
<tr>
<td>MVP without MR</td>
<td>1, 2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Thrombogenic</td>
</tr>
<tr>
<td>Mild PS</td>
<td>1, 2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Thrombogenic</td>
</tr>
<tr>
<td>PVCs, PACs</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Arrhythmic Thrombogenic</td>
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</tbody>
</table>

## MODERATE RISK

<table>
<thead>
<tr>
<th>Condition</th>
<th>CHC</th>
<th>POP</th>
<th>Injection</th>
<th>Implant</th>
<th>LNG-IUD</th>
<th>Cu-IUD</th>
<th>1° Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repaired TOF</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1, 2</td>
<td>Endocarditis Thrombogenic</td>
</tr>
<tr>
<td>Arrhythmias AFIB/AFL</td>
<td>4,3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1</td>
<td>1, 3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Thrombogenic</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mild ↓ LVSF</td>
<td>2, 4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1, 2</td>
<td>2</td>
<td>Fluid retention Hypertension Thrombogenic</td>
</tr>
<tr>
<td>HOCM</td>
<td>2,3,4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Arrhythmic Endocarditis Thrombogenic</td>
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<tr>
<td>Moderate native aortic valve disease</td>
<td>2, 4&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1, 2</td>
<td>2</td>
<td>Endocarditis Thrombogenic</td>
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<tr>
<td>Mild aortic root disease</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Hypertension</td>
</tr>
<tr>
<td>Marfan w/o ↑ Root</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Bicuspid aortic valve w/o ↑ root</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Repaired coarc</td>
<td>1,3&lt;sup&gt;d&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Not warfarin vs on warfarin  
<sup>b</sup> Isolated 2 vs sequelae (3 or 4)  
<sup>c</sup> Uncomplicated vs complicated  
<sup>d</sup> Uncomplicated vs with htn, aneurysm
# HIGH RISK LESIONS

<table>
<thead>
<tr>
<th>Condition</th>
<th>CHC</th>
<th>POP</th>
<th>Injection</th>
<th>Implant</th>
<th>LNG-IUD</th>
<th>Cu-IUD</th>
<th>1° Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI</td>
<td>4</td>
<td>1, 2, 3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1, 3</td>
<td>1, 2, 3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1, 2, 3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1</td>
<td>Glucose metabolism, Hypertension, Lipid metabolism, Thrombogenic</td>
</tr>
<tr>
<td>Mechanical prosthetic valve</td>
<td>3, 4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1</td>
<td>1, 3&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1</td>
<td>3*</td>
<td>4*</td>
<td>Bleeding, Endocarditis, Thrombogenic</td>
</tr>
<tr>
<td>Complex CHD wo PHTN Fontan</td>
<td>4</td>
<td>1</td>
<td>2, 3&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>Fluid retention, Hypertension, Thrombogenic</td>
</tr>
<tr>
<td>Aortic root dilatation &gt; 4 cm</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Endocarditis, Thrombogenic</td>
</tr>
<tr>
<td>Mild aortic root disease Marfan w/o Inc Root</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Hypertension</td>
</tr>
<tr>
<td>Bicuspid aortic valve Repaired coarc</td>
<td>1, 3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>a. Initiation vs continuation USMEC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. B. bileaflet mech vs Bjork-Shiley or Starr Edwards valves on warfarin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. On warfarin vs non on warfarin</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>d. 3 if no other acceptable method and risk pregnancy outweighs risk vasovagal event</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
**PREGNANCY CONTRAINDICATED**

<table>
<thead>
<tr>
<th>Condition</th>
<th>CHC</th>
<th>POP</th>
<th>Injection</th>
<th>Implant</th>
<th>LNG-IUD</th>
<th>Cu-IUD</th>
<th>1° Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small NYHA Class III or IV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Depends on underlying etiology</td>
</tr>
<tr>
<td>Severe Pulm HTN</td>
<td>4</td>
<td>1, 4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1, 3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1</td>
<td>3, 4&lt;sup&gt;d&lt;/sup&gt;</td>
<td>4</td>
<td>Bleeding Hypertension Thrombogenic Vasovagal</td>
</tr>
<tr>
<td>Severely ↓ LVSF</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Arrhythmia Fluid retention Hypertension Thrombogenic</td>
</tr>
<tr>
<td>Severe aortic or mitral stenosis (adapted)</td>
<td>2, 4&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1</td>
<td>1, 3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1</td>
<td>1, 2</td>
<td>1, 3</td>
<td>Arrhythmic Thrombogenic</td>
</tr>
</tbody>
</table>

- **Green:** Working group
- **Red:** USMEC
- **Black:** Both

- Not on bosentan vs on bosentan
- Not on warfarin vs on warfarin
- Recommend using back-up contraception if on Bosentan
- 3 if not other acceptable method and risk of pregnancy outweighs vasovaginal risk
BALANCE CONTRACEPTION VS PREGNANCY RISK

CHD ISSUES:

• Thrombogenic alterations
• Fluid retention
• Blood pressure changes
• Changes in lipid/glucose metabolism

RECOMMENDATIONS:

CHC: 4
DMPA: 1,2,3*
POP1,2,3*
Implant: 1,2,3*
LNG-IUD: 1,2,3*
Copper IUD: 1-- May be best option; if unacceptable consider LARC

*Initiation vs. continuation for CDC MEC

CDC MEC
UK Working Group
Black: Both

CDC MEC 2010; Thorne S. et al. 2006
Heart 92: 1520; Thorne S et al.
J.FamPlan 2006 32: 75