UCSF Pregnancy and Cardiac Treatment (PACT) program: a model to improve patient care and education enrichment

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Maternal heart disease complicates 0.2–4% of all pregnancies in western industrialized countries

Most women with CV disease can have a pregnancy with proper care. There is an increased risk to mother and fetus.

Pre pregnancy (preconception) evaluation is mandatory.
Maternal cardiac disease in pregnancy

- Pre-1960 US and Developing world: rheumatic disease

- United States:
  - Congenital heart disease
  - Cardiomyopathy
Maternal cardiac disease in pregnancy

First step is preconception counseling and evaluation
Effects of pregnancy on mother’s cardiac situation: risks to mother

Whether risks will change with time or treatment

Long-term outlook for the mother

Risks to fetus/neonate

Alternative options: adoption, surrogacy
Visit to regional center where expertise in ACHD and high risk pregnancy

- History, physical exam, ECG

- Echocardiogram: assess ventricular function, valves, vessels, PAp and shunts

- If PAp in doubt: cardiac cath

- Exercise testing: functional status
Preconception: Genetic Counseling

* Family history

* Incidence of mothers with congenital heart disease having affected children 2.5% and 18%
  * Fathers with congenital heart disease having affected children is between 1.5% and 3.0%.

* Up to 50% in single gene defects (Marfan syndrome, 22q11 deletion)

* Consider genetic analysis in some situations (e.g. tetralogy of Fallot)

* Offer appointment with clinical geneticist
  * Discussion of partner’s genetic history
Preconception: Genetic Counseling

- Reproduction, Endocrine, Infertility Specialist
  - Pre implantation Genetics
  - Surrogate Carrier
Preconception Assessment

- A limited number of cardiac diagnoses where pregnancy is extremely high risk:
  - Pulmonary arterial hypertension of any cause
  - Severe systemic ventricular dysfunction (LVEF <30%, NYHA III–IV)
  - Previous peripartum cardiomyopathy with any residual impairment of left ventricular function
  - Severe mitral stenosis, severe symptomatic aortic stenosis
Preconception Assessment

* A limited number of cardiac diagnoses pregnancy is not advised and extremely high risk:

  * Marfan syndrome with aorta dilated >45 mm
  * Aortic dilatation >50 mm in aortic disease associated with bicuspid aortic valve
  * Native severe coarctation

Patients who meet criteria for intervention should undergo repair prior to pregnancy
### Cardiovascular Changes in Pregnancy

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Change</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>↑</td>
<td>Average increase of 10-15 beats per minute</td>
</tr>
<tr>
<td>Cardiac output</td>
<td>↑</td>
<td>Increases 30-50%</td>
</tr>
<tr>
<td>Blood volume</td>
<td>↑</td>
<td>Average of 40%</td>
</tr>
<tr>
<td>Vascular resistance</td>
<td>↓</td>
<td>Both pulmonic and systemic vascular resistance decrease</td>
</tr>
<tr>
<td>Colloid pressure</td>
<td>↓</td>
<td>Total albumin increased but concentration decreased</td>
</tr>
</tbody>
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Prospective Multicenter Study of Pregnancy Outcomes in Women With Heart Disease
Circulation 2001;104;515-521
DOI: 10.1161/hc3001.093437
Predictors of primary cardiac events were incorporated into a revised risk index in which each pregnancy was assigned 1 point for each predictor when present.

No pregnancy received greater than 3 points.

The estimated risk of a cardiac event in pregnancies:

- 0 is 5%
- 1 is 27%
- >1 is 75%
Maternal Cardiac Disease and Pregnancy

- Genetic counseling
- Avoidance of drugs harmful to fetus
- Antepartum care – c-v and obstetric
- Fetal growth and development
- Labor – heart and obstetric considerations
- Antibiotic prophylaxis
- Postpartum care
- Contraception
Medications

* Reasonably safe to use during pregnancy
  * Digoxin
  * Quinidine
  * Procainamide
  * Ca channel blockers
  * \(\beta\) blockers
  * Lasix
  * Heparin
If possible, avoid during pregnancy:

- Phenytoin
- ACE inhibitors
- Coumadin
- Statins
Comparing Effectiveness of Family Planning Methods

More effective
Less than 1 pregnancy per 100 women in 1 year

- Implants
- IUD
- Female sterilization
- Vasectomy

- Injectable:
  - LAM

- Pill:
  - Take a pill each day

- Patch, ring:
  - Keep in place, change on time

- Condoms, diaphragm:
  - Use correctly every time you have sex

- Fertility awareness methods:
  - Abstain or use condoms on fertile days. Newest methods (Standard Days Method and TwoDay Method) may be easier to use.

- Withdrawal, spermicides:
  - Use correctly every time you have sex

Less effective
About 30 pregnancies per 100 women in 1 year

- Male condoms
- Diaphragm
- Female condoms
- Fertility awareness methods
- Withdrawal
- Spermicides

How to make your method more effective

- Implants, IUD, female sterilization: After procedure, little or nothing to do or remember
- Vasectomy: Use another method for first 3 months
- Injectable: Get repeat injections on time
- Lactational amenorrhea method, LAM (for 6 months): Breastfeed often, day and night
- Pill: Take a pill each day
- Patch, ring: Keep in place, change on time
- Condoms, diaphragm: Use correctly every time you have sex
- Fertility awareness methods: Abstain or use condoms on fertile days. Newest methods (Standard Days Method and TwoDay Method) may be easier to use.
- Withdrawal, spermicides: Use correctly every time you have sex

Sources:
PREGNANCY AND HEART DISEASE

* Before pregnancy
  High-risk pregnancy unit, clinical exam, ECG, CXR, Echo, exercise test
  Discuss maternal and fetal risks

* During pregnancy
  Team approach, fetal Echo

* Labor and delivery
  Obstetrician, cardiologist, anesthesiologist, nursing
  We tailor management to specific needs
An unique and innovative collaboration in order to provide coordinated specialty care to women with congenital, genetic and acquired heart disease.

UCSF PACT program
PACT program: comprehensive model of care

- Pre-conception consultation services
- Obstetrical (including Ob Anesthesia) and cardiology consultation services during pregnancy
- Maternal transfer services
- Perinatal genetics services
- Prenatal fetal echocardiography
- Specialized labor and delivery unit offering telemetry
- Anesthetic management during labor and delivery
- Postpartum maternal follow-up program enabling long term preventive care
The PACT team meets formally once per month to discuss specifics of management of individual patients and combines the following disciplines:

- Maternal-Fetal Medicine and Genetics
- Cardiology
- Nursing (Outpatient and Birthing Center)
- Anesthesia
Pregnancy in women with cardiac disease places the mother/fetus at greater risk and requires multidisciplinary approach.

- The Cesarean Delivery rates are not increased.
- They are more likely to have an operative vaginal delivery.
- Acceptable outcomes can be expected in these mothers with a multidisciplinary approach.
* ALWAYS have an evaluation with a cardiologist and Maternal-Fetal Medicine specialist

* Ask:

  What is the risk to me?
  Is it possible pregnancy will make my heart worse?
  What is my prognosis?
What is the risk to my baby?
Should I deliver in my local hospital or at a special center where the whole team is together?

WHAT IS BEST FOR YOU AND YOUR PARTNER
Most women with heart disease can have a pregnancy with proper care

Pre-pregnancy evaluation vital

High risk cases benefit from

High risk cases benefit from combined Maternal-Fetal Medicine (Perinatologist) and Cardiologist in the same center
PACT program: it takes a Village!

http://obgyn.medschool.ucsf.edu/mfm/clin_studies/pact.aspx