

PROSPECTIVE EVALUATION FROM SINGLE CENTRE
OF PREGNANCY
IN WOMEN WITH CONGENITAL HEART
DISEASE

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PREGNANCY AND CONGENITAL HEART DISEASE

- Hemodynamic changes of the pregnancy may induce deterioration of the cardiovascular state in CHD
- Course of pregnancy and maternal outcome is influenced by the nature of CHD, by the functional capacity of the patient and the sequelae of prior surgical repairs
- **COMPLICATIONS INDUCED BY PREGNANCY:**
 - heart failure (both in cyanotic and acyanotic CHD),
 - arrhythmias
 - pregnancy-induced hypertension reported more frequently
 - bleeding complications in cases on anticoagulant therapy
- Pharmacological treatment may present some problems for the mother or the fetus

OUTCOME OF PREGNANCY IN 147 MOTHERS WITH CHD

- OBJECTIVES OF THE STUDY:
- To analyse the course of pregnancy and outcome in women with congenital heart disease with respect to their cardiac lesions and current cardiovascular state
- complications
- and eventual influence on the cardiovascular state after pregnancy

MATERIAL AND METHODS

PATIENTS:

- **173 women** (mean age 28 years, range 21-41), referred to our Centre for fetal echocardiography and evaluation of maternal condition were studied between 1995 - 2005
- 21 women were followed during 2 pregnancies and 4 in 3;
- **Total 201 pregnancies analysed** (4 twins)
- 130 women were at their 1st pregnancy, 55 at 2nd pregnancy, 12 at the third pregnancy and 4 at the 4th -6th pregnancy
- **8 women had previously 1 spont. abortion, 2 had 2 abortions:**
(10 events in acyanotic CHD,
2 in a woman with Fallot's Tetralogy)

METHODOLOGY

1/ Analysis of cardiac history and state of mothers

- type of CHD, operations (palliative or definitive correction),

- residual cardiac defects / arrhythmias

- need of medications prior to the pregnancy, or during..

Maternal condition during labor-delivery, post-partum and eventual long-term influence on the cardiac state

2/ Fetal and neonatal outcome:

gestational age at delivery, birth weight, postnatal complications

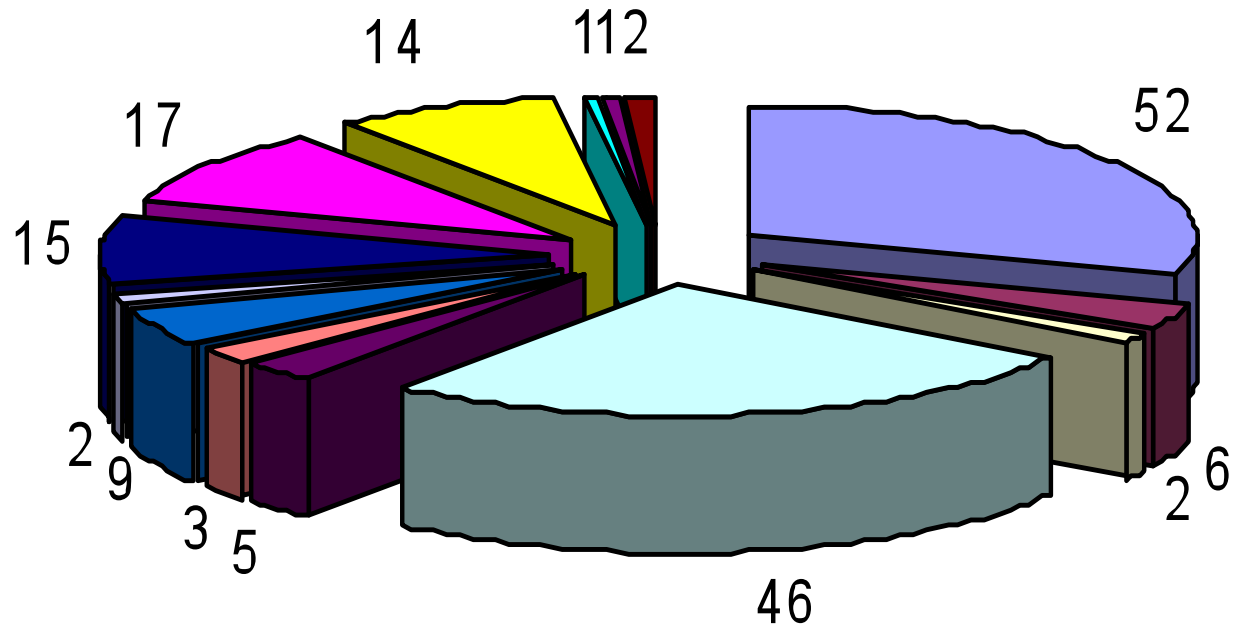
Cardiological follow-up of women and neonates - in 150 c. in our Center, otherwise in other Centers, with the documentation checked by our equipe)

Patients 2/

Type of maternal disease:

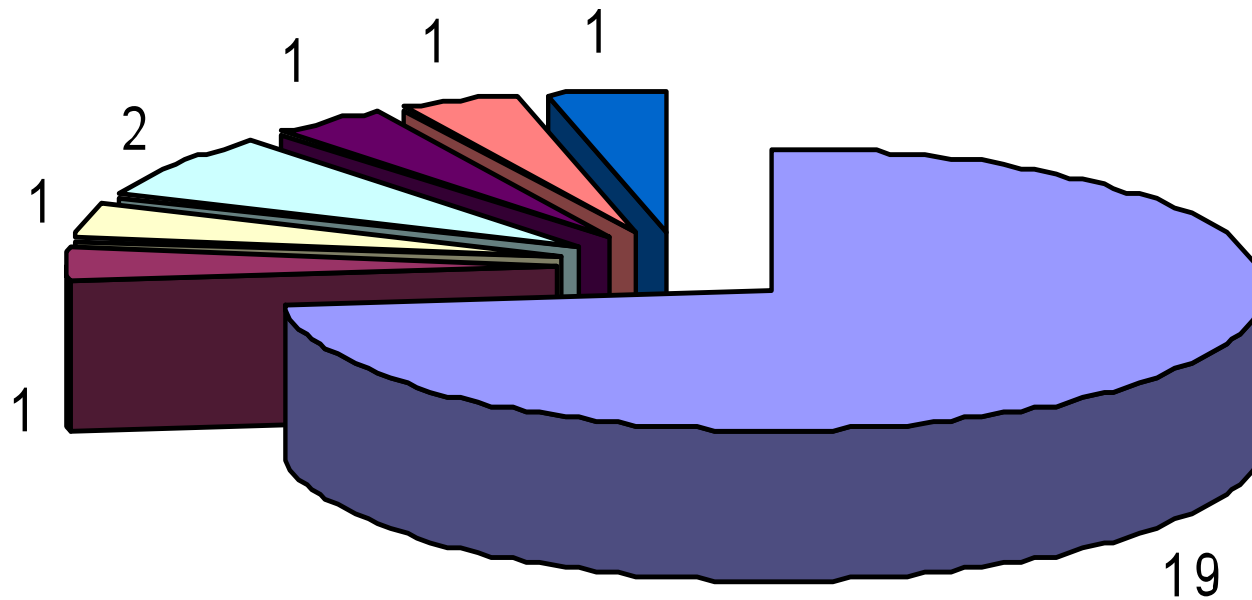
- **152 women had acyanotic CHD**, 100 operated
followed in **175** pregnancies
- **21 women had cyanotic CHD**, all operated
followed in **26** pregnancies

Acyanotic CHD



- | | | |
|-------------------|--------------------|--------------------|
| ASD II | ASD + PS | PAPVD |
| VSD | VSD + AoI | VSD + PS |
| Ductus arteriosus | Partial AV defect | PS |
| AoS/Subvalv. AoS | CoA | Double aortic arch |
| Ebstein | Mitral dyspl/prol. | |

Cyanotic CHD



- Tetralogy of Fallot
- UVH+PS
- TGAcorr+ Pulm. Atresia+VSD
- Cor triatriatum
- Pulm. atresia +VSD
- TGA+VSD
- TAPVD

Patients 3/

18 patients (in 20 pregnancies) had increased risk due to major residual hemodynamic lesions:

- residual gradients > 30 mmHg,
- pulmonary hypertension (>50 mmHg)
- systemic hypertension ($> 140/90$ mmHg)

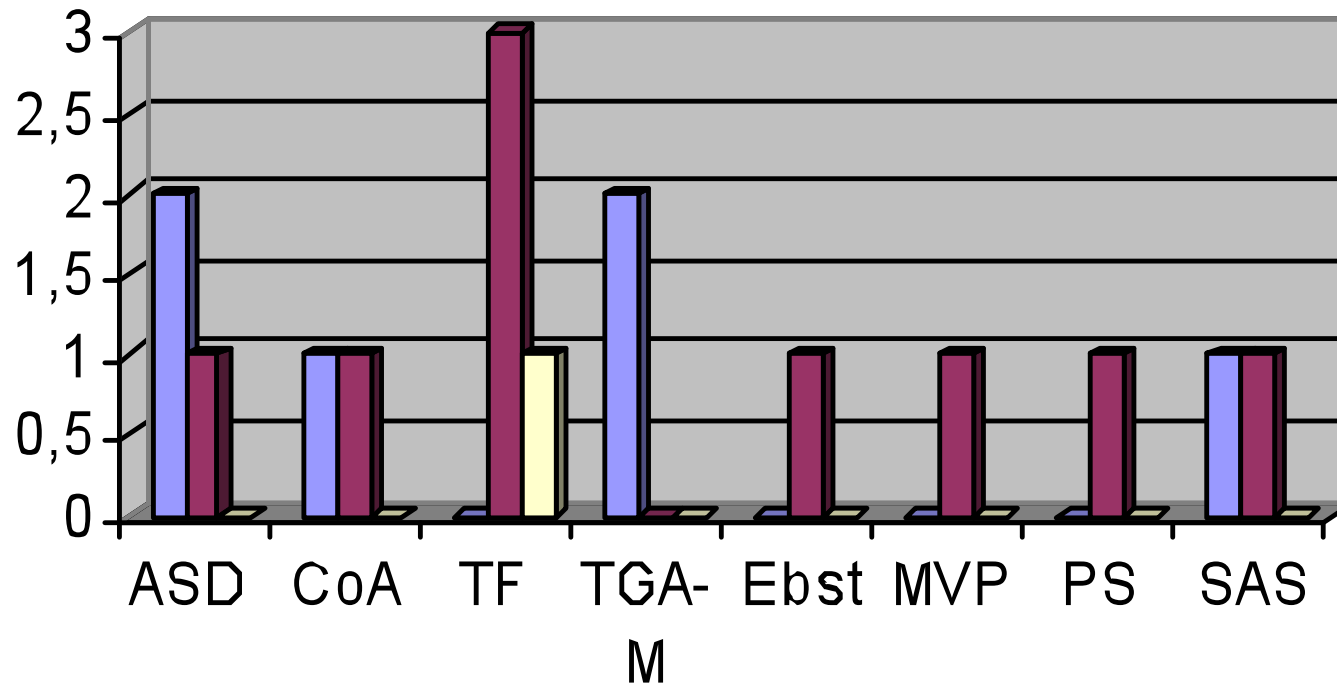
accordingly to the indication of the risk factors in a previous report (*)

or due to complex arrhythmias

-salves or episodes of SVT and VT) , requiring antiarrhythmic treatment

*Siu SC et al.. Risk and Predictors for Pregnancy-Related Complications in Women With Heart Disease .
Circulation. 1997; 96: 2789-2794

Arrhythmias in CHD



Complex Arrh ExSVN AVB-PM

Patients 4/

15 women needed specific medications in pregnancy

9- antiarrhythmic and hypotensive drugs,
3 -anticoagulants for mechanical aortic valve prosthesis
and 1 antiaggregants

3 women were not compensated, in class NYHA 2-3:

1 patient with CoA operated 2x, with residual isthmic aneurysm-
had severe systemic hypertension and poorly controlled arrhythmias

1 patient operated in adult age for ASD II with residual pulmonary
hypertension and complex arrhythmias

1 patient with Pulm.atresia +VSD operated with shunt had RV
insufficiency

METHODOLOGY

1/ Statistical Analysis

Fisher Exact test was used to compare the **frequency of complications** in cases with and without increased risk, for the whole series and specifically for the patients with acyanotic and cyanotic CHD

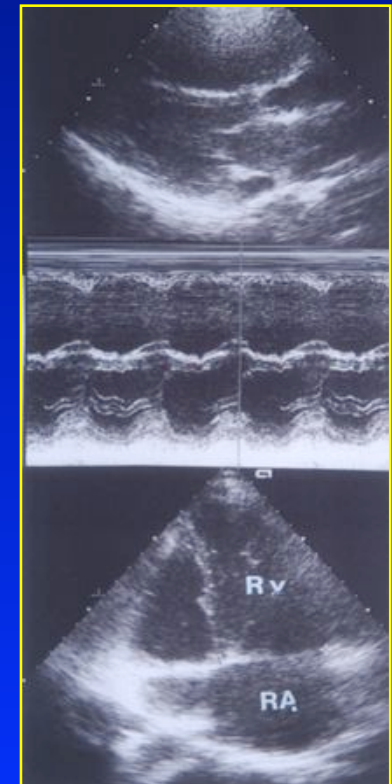
RESULTS: CARDIAC COMPLICATIONS DURING PREGNANCY

- Occurred 9/201 (4.5%), pregnancies:
 - in 6/175 (3.4%) pregnancies with acyanotic lesions,
 - in 3/26 (11.5%) with cyanotic lesionsand in 9/20 pregnancies of the risk group (45%),
with a statistically significant difference with respect
- to the non risk group

($p < 0.0001$ for the whole series and acyanotic lesions,
 $p < 0.02$ for the cyanotic lesions).

CARDIAC COMPLICATIONS DURING PREGNANCY 2/

- 2 cases had **severe arrhythmias**
 - 1 pt. with operated ASD II and residual pulm.hypertension
 - 1 pt. operated AS and PDA
- 1 pt. with unoperated ASD II
 - had at 2.nd pregnancy at 34 w.
 - signs of heart failure** and emergency CS
- 2 cases had **increased gradient:**
 - 1 pt. with unoperated Coa - at 34 w.g. anticipated CS
 - 1 pt. Tetralogy of Fallot operated, with residual PS, increased gradient at 20 w.g. to 80 mmHg, stable after



CARDIAC COMPLICATIONS DURING PREGNANCY 3/

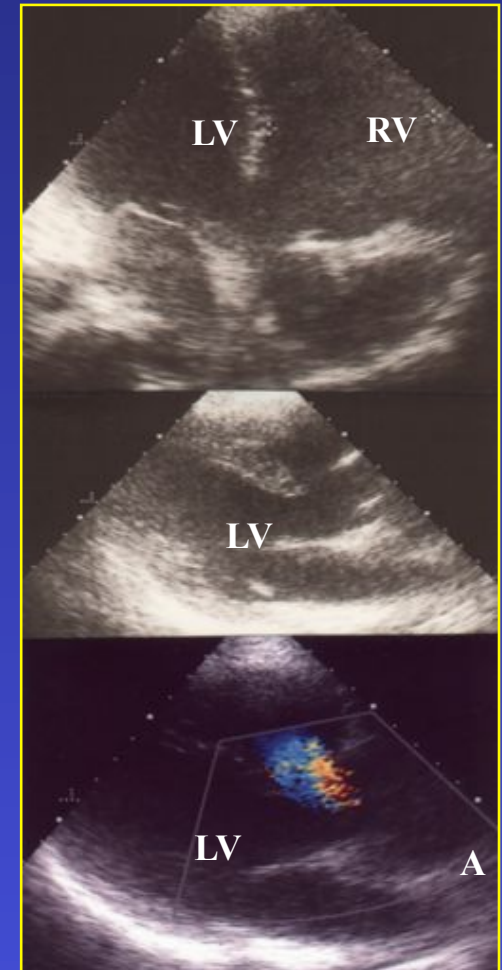
- 1 pt. with CoA , oper. 2x., with residual large isthmic aneurysm and systemic hypertension and arrhythmias prior to pregnancy
- (1st pregnancy CS at 32 w.g. for perinatal distress and sudden death of the premature infant at 20d.)
- - *during this 2nd pregnancy:*
- **recurrent crisis of SV/V Arrhythmias and hypertension**
- (despite treatment with calcium antagonists and beta-blockers)
- *at 34 w.g.:* **hypertensive crisis**, planned emergency CS,
- however had a subitaneous **rupture of aneurysm, tamponade and died**
- Male baby resuscitated, survived without major CNS problems

CARDIAC COMPLICATIONS DURING PREGNANCY4/

- **Cyanotic Pts.**

1 pt. with complex UVH and PS,
with systemic-pulmonary shunt presented
at 28 w.g. **worsening of cyanosis** and CS

1 pt. with Pulm.atresia+VSD and shunt -
severe desaturation at 27 w.g. -
started continous oxygen therapy
- till CS at 31 w.g.



CARDIAC COMPLICATIONS POST PARTUM

1 pt. with prosthetic aortic valve

On anticoagulants

had hemorrhage post-partum

Baby alive and well

Frequency of complications in pregnancy related to the CHD or treatment in different types of CHD

Type of CHD	Number and % complications in operated cases	Number and % complications in unoperated cases	Number complications in all pregnancies	Type of complication
ASD II	1/39 2.6 %	1/6 16.7 %	2/ 52 3.8%	1 arrhythmias; 1 heart failure
Aortic/Subaortic stenosis	2/8 12.5%		2 /17 11.8%	1 arrhythmias 1 hemorrhage
CoA	1/ 7 14,3%	1/ 2 50%	2/14 14.3%	1arrhythmias- hypertension-death; 1 increased gradient
Pulmonary atresia + VSD	1/1		1/1	desaturation
UVH + PS	1/1		1/1	desaturation



**Maternal indications for the cesarean section
for cardiac reason (in 29 cases):**

<i>Maternal CHD</i>	<i>Number of cases</i>
Aortic valvar / subvalvar aortic stenosis	10
Tetralogy of Fallot	6
ASD II (+ PHt and arrhythmias)	4
CoA	4
VSD + Aortic insufficiency + previous IMA	1
UVH + PS	1
Pulmonary atresia + VSD	1
TGAc + Pulmonary atresia+VSD	1
Ebstein	1

RESULTS: OUTCOME OF PREGNANCY

- 2/154 pregnancies: intrauterine death
 - - for Rh-isoimmunisation at 22 w.g.
 - - at term - umbelical chord node
- 152 babies born alive, premature babies - done well
- **Cesarian section:** performed in 23 pts.
for maternal condition
- **No neonatal death**

Neonatal data of 203 live born infants

Gestational age w.g.	N.infants/ %	HD	Type of maternal CHD
Term 37-41 w.g	188 – 92.6 %	196 - >2600g., median 3100g 2 SGA	
Premature 33-36 w.g.	13 – 6.4 %	1500- 2500g	2 VSD (1 oper, 1 non oper.) 2 ASD II (1 oper.+Pht, 1 non oper.) 2 CoA (1 oper., 1 non oper.) 2 Subvalvar AS oper. 1 Valvar AS oper. 1 SP non oper 2 TF 1 TGA oper.Mustard
Premature <32 w.g	2 - 1%	< 1200g (800g, 1150g)	UVH+ PS oper. (28 w.g., 800g) Pulm. atresia +VSD oper. (31 w.g., 1150g)
SGA	10 - 4.9%		1 VSD non oper., 1 VSD+AI oper. 2 ASD II, 2 AS, 1 subvalvar AS, 1 TF UVH+ PS oper.; P.atresia+VSD

Recurrences of heart disease in 6 cases

Type – n. cases	CHD in mother	CHD in infant
Concordant type – 3 cases	ASD II - 2 cases ASD II - 1 case	ASD II - 2 cases ASD II + VSD
Discordant type – 3 cases	VSD - 1 case Tetralogy of Fallot - 1 case Subvalvar aortic stenosis - 1 case	Tetralogy of Fallot Persistent left superior vena cava Ebstein

LONG-TERM EFFECT OF PREGNANCY ON CARDIAC STATE

- 1 pt. with ASD II and 1 pt. with CoA planned immediately surgical correction
- worsened cardiac state in pt. with DCMP
- unchanged hemodynamic and rhythm condition in the remaining pts.

CONCLUSIONS

- Women with simple CHD or without important hemodynamic or rhythm sequelae had **uncomplicated course of pregnancy** and no impact on the subsequent cardiac state.
- Some lesions as **ASD II** (event if operated), or **aortic stenosis/Coarctation of aorta** may present serious **problems, due to arrhythmias or systemic or pulmonary hypertension.**
- **Cyanotic lesions potentially worsen during pregnancy**
- Close follow-up during pregnancy is recommended.

