

Pregnancy in patients with heart disease

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Summary

Purpose: The study was carried out to ascertain the experience of pregnant women with cardiac disease in one referral center.

Methods: From 1986 to 2004, 242 pregnant women with heart disease were followed by the same obstetrical and cardiology center. The cardiac diagnosis was additionally confirmed with echocardiography and heart catheterization during cardiosurgery. The subjects were classified into groups with respect to the congenital heart abnormality type, and cardiovascular insufficiency according to the NYHA classification. The results from the evaluated groups were compared to a control group.

Results: A significant increase in percentage of congenital heart disease was found, however acquired cardiac defects prevailed. A significant increase in rate of congenital heart disease was found. A higher incidence of cesarean sections in women with underlying heart disease with respect to the control group was also found.

Conclusions: In pregnant women with underlying heart disease, congenital heart disease is presently more frequent than acquired heart disease compared to the situation in the beginning of the analysis. Pregnancy duration time depends on cardiac sufficiency and it is statistically shorter in NYHA class III and IV patients.

Key words: Pregnancy; Heart disease; Maternal outcome; Fetal outcome; Cardiac complication; Obstetrical complication.

Introduction

Heart disease complicates about 1% of all pregnancies (2-4%) [1-3]. In the Western world rheumatic valvular disease incidence is steadily going down. The increasing incidence of survival of neonates with congenital heart disease results in an increased number of adult patients with congenital heart disease becoming pregnant. In many centers congenital heart abnormalities reach 50% of all heart defects diagnosed during pregnancy [3, 4]. Decreased number of deaths due to anesthesia and bleeding makes cardiac disease the third reason for peripartum mortality, following hypertension and vasculothrombotic states.

Materials and Methods

From 1986 to 2004, 242 pregnant women with heart disease were followed by the same obstetrical and cardiology center (Table 1).

The patients were included for analysis based on clinical evaluation. The cardiac diagnosis was additionally confirmed with echocardiography and heart catheterization during cardiosurgery. The subjects were classified into groups with respect to congenital heart abnormality type and cardiovascular insufficiency according to the NYHA classification (Table 2). The results from the evaluated groups were compared to a control group of 424 women with normal pregnancies. The average age of women was 29.9 [17-48], number of deliveries 2.1 [1-8] and there was no statistical difference between the two compared groups.

Statistical analysis was conducted using estimation theory, statistic tests, variation analysis and regression analysis.

Result

A significant increase in percentage of congenital heart disease was found, however acquired cardiac defects prevailed. A significant increase in rate of congenital heart disease (57% vs 41% valvular heart disease) was also seen. Still acquired heart diseases were the majority. Among acquired heart diseases the most common was mitral valve insufficiency and complex aortal-mitral lesions while among congenital cardiac abnormalities ASD, VSD and Barlow's syndrome led.

Table 1. — Type of heart disease.

Cardiac lesion	N	%
<i>Acquired heart disease:</i>	131	56.46
Mitral valve disease	76	32.78
Mitral valve obstruction	14	6.03
Mitral valve insufficiency	32	13.79
Mitral valve obstruction and insufficiency	10	4.31
Mitral valve plastic operation or commissurotomy	5	2.16
Artificial mitral valve implantation	15	6.47
<i>Aortal valve disease:</i>	55	23.71
Aortal valve obstruction	5	2.16
Aortal valve insufficiency	6	2.59
Aortal valve obstruction and insufficiency	9	3.88
Artificial aortal valve	5	2.16
Homogeny aortal valve	7	3.02
Surgical repair of aortal-mitral disease	2	0.86
Aortal-mitral disease without surgery	21	9.05
<i>Congenital heart disease:</i>	95	40.95
ASD	28	12.07
VSD	19	8.19
Left- to- right shunt defect.	6	2.58
Aortal coarctation	7	3.02
Tetralogy of Fallot	9	3.88
Ebstein's anomaly	5	2.16
Eisenmenger's syndrome	1	0.43
Barlow's syndrome	20	8.62
<i>Miscellaneous</i>	6	2.59

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Table 2. — Subject classification in groups according to NYHA classification with respect to age.

Age	Cardiac lesion							Control	Total
	NYHA I	NYHA II	NYHA I NYHA II	NYHA III	NYHA IV	NYHA III NYHA IV	NYHA I, II, III, IV		
≤ 20	12 (15.38%)	—	12 (7.02%)	3 (6.0%)	—	3 (4.92%)	15 ≈ (6.47%)	29 (6.87%)	44 (6.73%)
21-25	18 (23.08%)	26 (27.96%)	44 (25.73%)	11 (22.0%)	1 (9.09%)	12 (19.67%)	56 < (24.14%)	133 (31.52%)	189 (28.90%)
26-30	22 (28.21%)	24 (25.81%)	46 (26.90%)	9 (18.0%)	2 (18.18%)	11 (18.03%)	57 < (24.57%)	119 (28.20%)	176 (26.91%)
31-35	11 (14.10%)	20 (21.51%)	31 (18.13%)	12 (24.0%)	2 (18.18%)	14 (22.95%)	45 > (19.40%)	69 (16.35%)	114 (17.43%)
36-40	13 (16.67%)	19 (20.43%)	32 (18.71%)	10 (20.0%)	5 (45.45%)	15 (24.59%)	47 > (20.26%)	60 (14.22%)	107 (16.36%)
≥ 41	2 (2.56%)	4 (4.30%)	6 (3.51%)	5 (10.0%)	1 (9.09%)	6 (9.84%)	12 > (5.17%)	12 (2.84%)	24 (3.67%)
Total	78 (100%)	93 (100%)	171 (100%)	50 (100%)	11 (100%)	61 (100%)	232 (100%)	422 (100%)	654 (100%)

In upper NYHA stages the preterm labor incidence was higher (31.1%) while in NYHA class I and II it was lower (5.3%- 9.4%) compared to the control group.

We found a higher incidence of cesarean section in women with underlying heart disease with respect to the control group (10% in I and II NYHA class and 93% in NYHA class III and IV) (Table 4).

Table 3. — Pregnancy duration in women with underlying cardiac lesions (NYHA I, II; NYHA III, IV) and the control group in weeks of gestation.
(n - number, \bar{x} average, s - standard deviation).

Group	n	\bar{x}	s	min	max	Kruskal Wallis H-test
NYHA I, II	171	39.336	1.869	23.43	42.71	H = 60.04
NYHA III, IV	61	37.244	2.391	27.43	42.00	p = 0.0000
Control	422	39.340	2.247	23.14	42.86	Statistical importance

Table 4. — Mode of delivery.

	NYHA I, II	NYHA III, IV	Control	Total
Vaginal	100	4	380	484
% of column	58.48%	6.56%	90.05%	
% of line	20.66%	0.83%	78.51%	
% of total	15.29%	0.61%	58.10%	74.01%
cc - obstet. ind.	36	1	41	78
% of column	21.05%	1.64%	9.72%	
% of line	46.15%	1.28%	52.56%	
% of total	5.50%	0.15%	6.27%	11.93%
cc - obstet. and card. ind.	6	8	0	14
% of column	3.51%	13.11%	0.00%	
% of line	42.86%	57.14%	0.00%	
% of total	0.92%	1.22%	0.00%	2.14%
cc - card. ind.	17	47	0	64
% of column	9.94%	77.05%	0.00%	
% of line	26.56%	73.44%	0.00%	
% of total	2.60%	7.19%	0.00%	9.79%
Vacuum, forceps obstet. ind	4	0	1	5
% of column	2.34%	0.00%	0.24%	
% of line	80.00%	0.00%	20.00%	
% of total	0.61%	0.00%	0.15%	0.76%
Vacuum, forceps card. ind	8	1	0	9
% of column	4.68%	1.64%	0.00%	
% of line	88.89%	11.11%	0.00%	
% of total	1.22%	0.15%	0.00%	1.38%
Total	171	61	422	654
%	26.15%	9.33%	64.53%	100.00%

Duration of pregnancy was shorter in patients with heart disease and obstetrical results were worse compared to the controls, especially after 34 weeks of gestation. (Table 3) (Figure 1).

Preterm deliveries were almost one-third of all deliveries in NYHA class III and IV patients. Similarly, hypotrophic neonate incidence in III and IV class women was 5-fold higher than in the controls, and 2.5-fold higher in NYHA class I and II compared to the control group.

Also the Apgar scale results at the first and fifth minute were lower for neonates of women with heart disease compared to the controls.

During the observation period deterioration of cardiac insufficiency was observed in 23 women (10%). In almost all these patients [9] cesarean section was the mode of delivery. All parameters, i.e. duration of pregnancy, neonate birth weight and Apgar scale score were statistically worse in patients with underlying heart disease compared to controls. Such results may be explained by poorer hemodynamic conditions in the presented group of women who were mostly the subjects of NYHA class III.

Discussion

The most important objective for contemporary obstetrics is the safety of pregnant women during pregnancy, delivery and puerperium, in spite of the coincidence of serious diseases, i.e. cardiac diseases. Also equally important is the well-being of the neonate and early detection of any life threatening condition. The prophylaxis of prematurity and hypotrophy may result in the well-being of the neonate.

In our study, congenital heart disease was more frequent than acquired heart disease in pregnant women with underlying heart disease compared to the situation at the beginning of the analysis, which is in concordance with the report of Avila *et al.* [5] and other authors [6-8]. Shime *et al.* [4] presented a decreased proportion of vulvar/acquired cardiac lesions from 4:1 in 1962 to 1:1 in 1985. Similarly, McFaul *et al.* [10], reported a group of 519 patients with heart diseases who delivered in the

Royal Maternity Hospital in Belfast where the percentage of valvular and congenital heart disease was 60% vs 31%.

The duration of pregnancy was shorter in higher classes of NYHA. The preterm delivery percentage in NYHA class III and IV was 31.15% and was three times higher than in the control group, while in NYHA class I and II duration of pregnancy was similar to the control group and even slightly lower (5.3-9.4%).

There was a considerable variation in the cesarean section rate in women with heart disease, from 3 to 36%, although there is wide agreement in the literature that cesarean section should be reserved for obstetrical reasons [12].

The high incidence of surgical deliveries in women with cardiac disease (NYHA class I and II) was 3-fold higher compared to the controls, in which it reaches 10%. In NYHA class III and IV it reaches 93%. Similar results were reported by Siu *et al.* – 27% [9], and McFaul *et al.* – 24% [10]; an exception is the work of Clark *et al.* [11].

Neonatal complications (18.6% of pregnancies) associated with poor functional class according to the NYHA are left heart obstruction, anticoagulation, smoking and multiple gestation, which is in concordance with other authors [13].

Conclusion

1. In pregnant women with underlying heart disease, congenital heart disease was more frequent than acquired heart disease compared to the situation at the beginning of the analysis.

2. Pregnancy duration time depends on cardiac sufficiency and it is statistically shorter in NYHA class III and IV patients.

3. The very high percentage of surgical deliveries in women with cardiac lesions (41.5% in I and II hemodynamic period and 93.4% in III and IV) is the result of the high cesarean section incidence. The most common indication for this procedure is the deterioration of cardiac sufficiency in NYHA class III and IV.

4. Deterioration, especially in NYHA class III and IV, is the reason for a more frequent incidence of hypotrophy and prematurity, and lower Apgar punctuation among children of women with underlying cardiac disease.

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