

Procreation and pregnancy in patients with congenital heart disease

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Abstract

Background: *Improvement in the treatment of congenital heart defects (CHD) prolongs survival time and provides the prospect of a better quality of life. The study was prompted by the increase in the CHD population of procreative age and the uncertainty related to procreation in CHD patients.*

Methods: *We analysed 98 pregnancies of women with CHD and compared the results with demographic data. Analysis was made of educational level, work capacity, fertility, deterioration in the clinical state and the percentages of labour at term and of vaginal births.*

Results: *CHD occurred in different forms as follows — ASD: 35%, ToF: 17.5%, VSD: 13%, AS: 11%, others: 24%. Surgical treatment was performed on 56% of cases. A total of 15 pregnancies were terminated by abortion. 78% of deliveries were at term. Vaginal births accounted for 76% of deliveries and caesarean section for 24%. The high-risk pregnancies accounted for stood at 36%. In all 85 children were born and 46% underwent cardiological examination. Fertility measured as the number of live births in the relation to the number of women was 1.82. Women with ToF and AS had the lowest fertility and others with ASD II had 2.5, which exceeds that indicated by the demographic data.*

Conclusions: *Patients with CHD have a higher educational level than average and 33% of them are active at work. There is no difference in the fertility of our group in comparison with the demographic data. The rate of cardiological examination of the neonates of the mothers with CHD remains low. The nature of CHD involved in each case is the main factor that influences the fertility, course of the pregnancy and mode of delivery. (Folia Cardiol. 2006; 13: 379–383)*

Key words: congenital heart disease, procreation, pregnancies

Introduction

As a result of the increasing quality of cardiological supervision of patients with congenital heart defect (CHD) and the rapid progress in cardiac surgery these individuals now have a longer life

span and, in consequence, present a medical challenge. Not only is life span increased as a result of improvements in treating CHD, but the quality of life is also enhanced. Before the advent of cardiac surgery mortality as a result of CHD among neonates and infants was 90%. Now over 70% of children reach adolescence. The majority of patients with CHD aim at leading their lives in the same way as the healthy population and this should also be the main goal of their treatment. This also extends to the desire to bear children. A pregnant woman's CHD may influence both mother and foetus. Both the course of pregnancy and the birth itself may cause serious complications. In healthy women there are some changes, usually asymptomatic, in the

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circulatory system, but these place a heavy burden on the circulation. The changes lie in an increase in blood volume and cardiac output (up to 50%). In women with CHD these changes may lead to cardiac insufficiency in both mother and the child.

Cardiac heart arrhythmias (supraventricular and ventricular extrasystoles) may be diagnosed in 5% of women and may be more severe in women with CHD. The changes in the circulatory system are even greater during labour, which may be of considerable significance for the patient in whom CHD is present.

The constantly increasing population of CHD patients who are at procreative age and want to have children has resulted in some valuable guidelines being drawn up and data about the pregnancies being collected.

It is of great importance to determine the level of risk, the methods of treatment and the fitness to undergo labour for each maternity patient with CHD. This will enable the patients with CHD to bear children in the future and to decrease the level of risk of pregnancy.

The rapid increase in the population of patients with CHD who are of procreative age has not only raised problems but has become the inspiration for research on the influence of CHD on procreation and pregnancy in these patients.

We attempted to answer the question of whether CHD in the mother endangers or otherwise influences procreation, the course of pregnancy and labour.

Methods

A retrospective study was performed on 98 pregnancies of 46 patients with CHD treated in the Paediatric Cardiology and CHD Clinics of the Medical University of Gdańsk. The spectrum of the CHD, the level of education, the number of children, the pregnancy and the labour were assessed. The results were compared to the demographic data [1] (Table 1). The data assembled for the chosen groups were compared with regard to different types of CHD and their treatment.

The frequency and type of CHD (Fig. 1) in the groups assessed were as follows: patients with ASD II formed 34.8%, with ToF — 17.4%, with VSD — 13%, with AS — 11% and with other forms of CHD (PDA, TGA, SV, CoA, Marphan's syndrome) — 24% of the population as a whole.

Surgical treatment or interventional procedures had been performed in 56% (26) of the patients and the other 44% (20) of women were not operated on as a result of disqualification from the treat-

Table 1. The characteristics of the group studied.

Age (years)	39.3 ± 13
Active occupationally	32.6%
Unemployed	32.6%
Receiving benefits	34.7%
Undergoing operation or interventional procedure	56%
Undergoing pharmacological treatment	63%
Number of pregnancies (mean value)	2.13 ± 1.09
Number of children (mean value)	1.89 ± 0.99

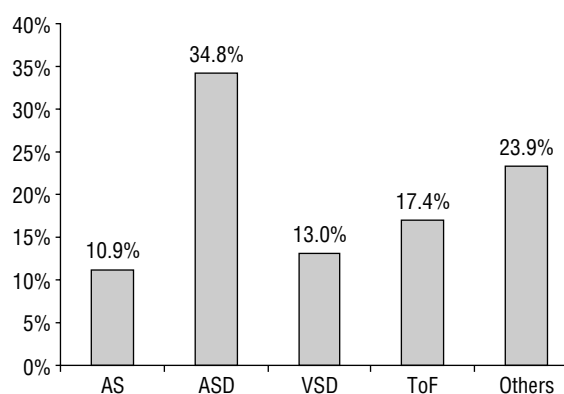


Figure 1. CHD type in the group studied.

ment (3), lack of agreement (8) or haemodynamic insufficiency (9).

In order to find out the factors that might have an influence on the pregnancy the following parameters were assessed in the patients with ToF and ASD II (both those that were and those that were not operated on):

- fertility;
- percentage of high risk;
- deterioration of health during the pregnancy;
- the number of labours at term;
- the number of natural labours;
- illnesses and defects diagnosed in the children;
- the number of children that had been examined by a cardiologist.

Results

The level of education of the patients with CHD in the group studied was statistically higher than in society as a whole (Fig. 2). Working women made up 33% of all those examined, while 34% were receiving benefits and 33% were unemployed.

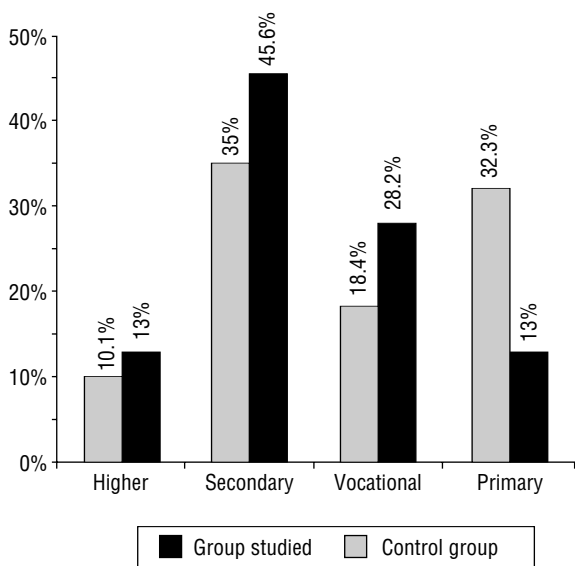


Figure 2. Level of education in the group studied in comparison with demographic data.

Of the 98 pregnancies analysed 15 were miscarried (2 patients miscarried several times). The corrected coefficient of miscarriages in the group studied was 11.7%. 78% of labours were at term and 76% were physiological. Caesarean section was undergone by 22 (24%) of the patients, 10 of these being for non-cardiological reasons. 36% of the pregnancies analysed were designated high-risk pregnancies for cardiological reasons.

In the group of 46 patients studied 15% had one child, 18% two children and the other 13% between three and five children. A total of 85 children were born (two twins). 46.4% of the children underwent examination by a cardiologist.

Fertility, as the number of live births in relation to the number of women, was 1.84 and did not differ from the demographic data (2.0; $p = 0.28$). Some differences were observed in the number of births of children to women with different forms of CHD.

The lowest fertility was among patients with ToF, AS and VSD. The fertility of patients with ASD II was 2.5, higher than the demographical data ($p = 0.064$). The mean age of the patients that gave birth to their first child was 23.8 ± 3.7 and to a second child 26.7 ± 3.7 , and this was similar to the demographical data.

Comparison of the patients with ToF and ASD II showed some statistically significant differences in fertility, 1.4 ToF/2.5 ASD II ($p = 0.018$). The patients with ToF were most often designated (82%) high-risk pregnancies, followed by those with ASD (24%), where $p = 0.001$. 45% of labours of patients with ToF were at term, corresponding to

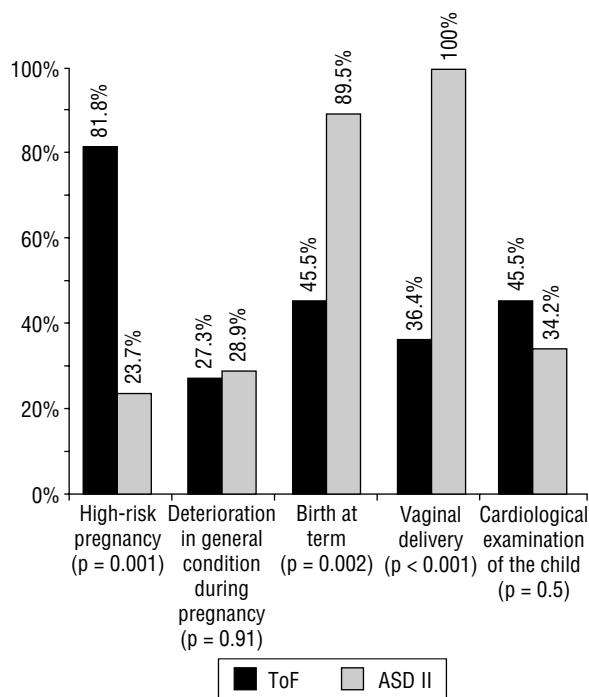


Figure 3. A comparison of data between patients with ToF those with ASD II.

89.5% of patients with ASD ($p = 0.002$). 36.4% of patients with ToF and 100% of patients with ASD II ($p = 0.001$) gave birth to a child through the natural passages. Natural deliveries were 36.4% (Fig. 3).

Differences between the patients operated on and those who were not were statistically significant only with regard to the numbers designated as high-risk pregnancies, which stood at 46.8% and 22.9% respectively ($p = 0.028$) (Fig. 4).

Discussion

Progress in the treatment of CHD has resulted in an increase in the number of patients of procreative age wishing to have children. Good results of the treatment of CHD have resulted in it no longer being a contraindication to pregnancy. The complex changes, both biochemical and haemodynamic, observed during pregnancy place a heavy burden on the circulatory system, especially in patients with CHD [2]. It is of great importance to assess pregnancy risk in women with CHD and to discourage them from becoming pregnant if they are patients at very high risk or else to try to diminish the risk.

The analysis of the material showed a significantly higher level of education among patients with CHD in comparison with that evidenced by demographical data [1].

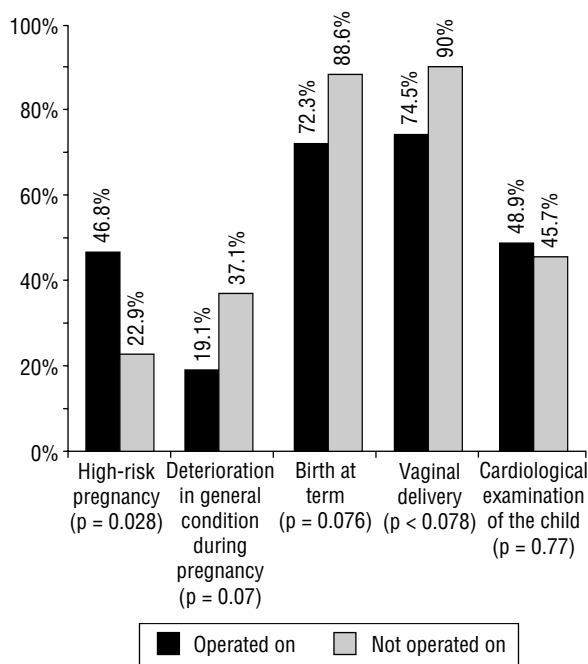


Figure 4. Comparison between patients operated on and those not operated on.

The fact that both the doctors and parents of the children with CHD are aware of the limitations associated with their future occupations, leads them to pay extra attention to the appropriate education of these children in the knowledge that occupations demanding a high level of physical stamina are contraindicated. As can be seen from the data analysed, this awareness brings the results that might be expected, and these are not hindered by a child's absence from school because of hospitalisation or medical treatment.

Only 33% of those analysed who had undergone higher education were occupationally active. The large number of unemployed patients or those receiving benefits might be due to the difficult situation on the job market and not to their medical limitations. The introduction of new practices might well enable more people in this group to work within their field of interest.

In the data analysed no serious pregnancy-linked complications could be observed. The fact that the number of serious complications is lower than in other publications might be due to a lack of patients with cyanotic and very severe CHD and to the relatively good circulatory systems of the patients in the group studied [2–7]. This might have an influence on the number of miscarriages observed in the population analysed, which is similar to demographical data. The function of the circulatory

system seems to be a major factor influencing the duration of pregnancy [2–7].

Significantly more patients with CHD (24%) compared to general population, are qualified for caesarean section, but in only 12 of these cases were the reasons strictly cardiological. Similar results can be observed in other publications [3, 4, 6, 7].

The analysed group makes the patients, who gave birth to their children over 15 years ago when concern about mother and child frequently was an indication to the caesarean section. Current scientific development and a better quality of medical services might contribute to an increase in the number of physiological births in patients with CHD.

The ages of women who gave birth to their first children as well as to following children were similar to the data concerning general population. Fertility, expressed as the number of live births to the number of women, was 1.84 and was similar to the demographic data, where it was 2.0 ($p = 0.28$) [1]. However, the analysis showed significant differences as far as different heart defects are concerned. Patients with ASD II had the greatest number of children, which, at 2.5, is higher than the demographic data. Patients with ToF, AS and VSD had the lowest fertility. The large differences between patients with ToF (1.4 *vs.* 2.5) were due to the great variety of heart defects concerned. ASD is considered by both patients and physicians as a much less severe defect and the effects of treatment are better. ToF is a complex heart disease, which demands very sophisticated treatment and sometimes these patients need to be re-operated on. The difference in the fertility between patients with ToF and ASD II has become the implication to make a comparison of those patients.

The pregnancies of patients with ToF were qualified as high-risk pregnancies four times as often as those of patients with ASD II. Only 45% of the patients with ToF had births at term, whereas this occurred twice as often in patients with ASD II. As in other publications differences are noticeable in the numbers undergoing physiological labour, 36% of patients with ToF and 100% of patients with ASD II [6, 7]. The deterioration of the health state of pregnant patients with ToF and ASD II was encountered equally often. The kind of treatment used, whether surgical or medical therapy, influenced assessment of pregnancy-related risk. Pregnancy in patients that were operated on was assessed as a high-risk pregnancy twice as often as in not operated on subjects. Similar results have been noticed in other publications concerning the pregnancies of women with CHD [2, 5].

The analysis showed very diverse courses of pregnancy and labour in patients with CHD. At one end of the spectrum is the course of the pregnancy, which is the same as in the demographic data, while at the other is the fact that between two and three pregnancies in patients with ToF are regarded as high-risk.

In the data presented the rate at which children of mothers with CHD then underwent cardiological examination was assessed. In view of the general belief that CHD running in the family increases the risk of a child having it, it is astonishing that so few children of mothers with CHD undergo examination by a cardiologist (48%) [8–10].

It is a matter of necessity that further investigations are carried out and that guidelines are drawn up for treating pregnant women with CHD. Such investigations, however, need to be performed on a larger population of pregnant women.

It seems that there are no absolute contraindications to women with CHD and who are NYHA I–II becoming pregnant. From our investigations and those published elsewhere, patients that are haemodynamically stable and receiving good cardiopulmonary treatment may become pregnant and give birth to healthy children in the same way as women without CHD [2–7]. However, the risk of giving birth to a child with CHD is higher in the population of patients with CHD than for other patients, ranging from 0% to 11% [8–10].

Conclusions

1. Pregnancies in patients with CHD are usually high-risk and delivery needs to be by caesarean section.
2. The course of pregnancies is the same as those for healthy women.
3. The children of mothers with CHD too infrequently undergo cardiological examination.

4. The type of the CHD involved is the main factor that influences the fertility, course of pregnancy and delivery.
5. Pregnancy in woman with CHD may involve serious complications and needs to be under the control of a specialist in this field.

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