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Direttore responsabile: Antonio Zama

# Young Woman with Congenital Complete Heart Block – Pacemaker Implantation Before Pregnancy – Whose Decision and When?

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AA. VV.

**Abstract**
In the past years we faced higher rates of cardiovascular complications in pregnant women due to increasing age of first pregnancy. Additionally, an increasing number of patients with congenital heart disease reached childbearing age and during pregnancy their cardiac condition must be monitored closely. The aim of our study is to analyze the outcome of pregnancies in women with congenital complete atrioventricular (AV) block, a heart condition which is responsible for life threatening arrhythmias even in normal hemodynamic condition.

Complete AV block as a congenital conduction disturbance is easy to diagnose early in life, the condition is usually recognized by the pediatric doctor and the patient and her family are aware of the diagnose, the consequence and the treatment. The child, then the teenager and the young adult female is usually monitored by a cardiologist. In spite they know their "special cardiac condition", very often they try to avoid medical correction-pacemaker implant, and postpone the cure after childbearing. Often, as cardiologist, we see the patient already pregnant and we have to manage the risk, not being able to prevent it.
**In order to understand the cardiac condition of the pregnant woman we have to know the physiological adaptations to pregnancy.** Plasma volume and cardiac output increase to meet the increased metabolic demands of mother and fetus and they reach a maximum of 40-50% above baseline at 32 weeks of gestation. This increase in cardiac output is achieved by a gradual increase in heart rate, which it might be impossible to realize in complete congenital AV block. The impaired adaptation of cardiac output is related to impaired uteroplacental flow and might be a major cause for fetal growth restriction. As an expected adaptation, the patient has high blood pressure which might add the risk of premature labor and eclampsia.
Women with this special cardiac condition need complex counseling, considering not only the medical disease, but also the emotional challenges in this physiological condition. The doctor should explain the patient the risk for herself, but also for the child, the long-term prognosis and the risk of miscarriage. **She has to understand the increased risk of obstetric complications, premature labor, pre-eclampsia, neonatal mortality and growth retardation when compared to general population. Thus, a careful follow-up of pregnancy, delivery and post-pregnancy management is mandatory.**

All women with known cardiac disease require pre-pregnancy counseling, which involves a medical team. Usually the obstetrician tends to prevent the risk by avoiding pregnancy and this is the major reason wh y the women prefer to “wait and see” and avoid the pre-pregnancy counseling. In the particular condition of complete congenital AV block the prognostic for mother and child under the circumstances of a careful follow-up is good according to the guidelines. But this is true for most of the suprahissian AV block with g ood effort toleration.
The prognostic is individualized according to the severity of symptoms and the response to effort test.

> **We follow-up four women with complete AV block, all at first pregnancy with the following characteristics:**
> 1. **Medical doctor, 34 y, known AV block since high school,**
> 2. **Engineer, 28 y, known AV block since childhood,**
> 3. **PC operator, 32 y, known AV block since the age of 18,**
> 4. **Office clerk, 24 y, known AV block since childhood.**
>
> **All of them have good effort response, complete congenital supra hissian AV block.**

ECG Holter monitoring revealed for all 4 of them intermittent AV block suggesting intrahissian blockage es pecially during night. Heart rate ranges between 37-42 beats-per- minute. Laboratory tests were in normal r ange and there were no comorbidities associated.
In spite repeated discussion about having children none of them have pre-pregnancy counselling and none a ccepted pacemaker implantation before pregnancy.
During follow-up we assess clinical condition by: clinical exam – to register heart rate, blood pressure, any signs or symptoms of heart failure, lab tests, standard ECG and echocardiography every month, to assess ca rdiac dimensions and systolic and diastolic performance, ECG Holter monitoring every 3 months.
There were not significant changes during pregnancy.
All of our patients were advised to plan caesarean delivery as quickly as secure for the child, taking into acc ount the higher blood pressure in all cases. There were no signs of preeclampsia and with one exception all have good hemodynamic evolution during pregnancy and at delivery. The 32-year-old PC operator, deve loped acute heart failure during the last trimester, with significant peripheral edema and dyspnea, but the he modynamic condition improved quickly after delivery with standard medication for heart failure according t o guidelines. We had a tight collaboration with the obstetrician in each case and agreed on caesarean deliver y. All 4 patients have premature lab our which preceded the planed delivery.
**All new-borne were extremely well monitored and all of them were healthy and regain rapidly the ex pected weight.**
The mothers were very disciplined during pregnancy and they did not gain much weight; this is a condition for reducing risks, but despite respecting all rules, severe bradycardia occurred during caesarean delivery.
In our opinion the imperative question that rising is: **should pacemaker implantation be mandatory for e very patient with complete congenital AV block before pregnancy despite good effort tolerance? S hould we recommend abortion for avoiding maternal risk, or pacemaker implantation in the last trimester?** For the last attitude we should take into account that we perform the procedure with shield prote ction for mother and the normal radiation dosage do not exceed a standard computer tomographic eva luation. Looking at guidelines [1,

2] we noticed that bradycardia is not listed to have high risk for pregnancy [5] but a limit is not pointed out. On contrary, heart failure [1, 3, 5], high blood pressure, ventricular arrhythmias [1-5] might be at severe risk. Taking into account the small number of cases we cannot provide a pertinent answer to this question.
**For the mother:** there is the risk of eclampsia, the risk of premature labor and the most severe – the risk du ring delivery of life-threatening arrhythmias including cardiac arrest. Is it worthy to try to implant a pace maker before delivery, taking into account the stress of medical procedure in a fragile patient – hemodynam ically and emotionally, and the radiation dose, although small, but not inexistent for fetus not for mother?
**And who stands for the child?** For the child there is the risk for growth retardation, hypo- oxigenation b ecause of impaired uteroplacental flow, and later in life the increased risk for diabetes. And not the least a potential need for implantation with exposure to radiation.
There is also an increased risk for doctors in this kind of patients: the obstetrician has to perform extremel y quickly the caesarean delivery with all the complications that may occur, the anesthesiologist has a diff icult task to individualized the dosage, the duration of procedure according to the frail cardiac condition of mother, the neonatologist stands in front of a premature new-borne and the cardiologist is unable to adjust the cardiac output in a complete AV block and to treat ventricular arrhythmias without the protection of a p acemaker.
**It is true that doctors have to face and solved illnesses and difficult problems for their patients but the y also must try to prevent them.** All these problems might be avoided with intelligent approach, good edu cation of patients in a close collaboration and confident relationship.

**The Authors:**
**IVAN Mihaela Viviana [1, 2]**
**APOSTOL A. [2]**
**TOIAN Dana [3]**
**URSARU Andreea Maria [4]**
**TESLOIANU Nicolae Dan [4*]**
**CIOCAN Veronica [5]**
*1 Cardiology Discipline, Internal Medicine II Department, University of Medicine and Pharmacy Victor Ba bes Timisoara (ROMANIA)*
*2 Cardiology Department, Emergency County Hospital Pius Brinzeu Timisoara (ROMANIA)*
*3 Endocrinology Discipline, University of Medicine and Pharmacy Victor Babes Timisoara (ROMANIA)*
*4 Cardiology Department, "Sf. Spiridon" Clinical Emergency Hospital Iasi (ROMANIA)*
*5 University of Medicine and Pharmacy Victor Babes Timisoara (ROMANIA)*
*Emails: ivanmvivi@yahoo.com, andreea_ursaru@yahoo.com, dan_tesloianu@yahoo.com*

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