

## Case Report

# Pregnancy and Wolff – Parkinson – White Syndrome: Case Report

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### Abstract

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The description of the case concerns a pregnant woman with a history of asymptomatic Wolff – Parkinson – White syndrome (WPW) diagnosed in childhood, who reported three episodes of supraventricular tachycardia during pregnancy. The first two episodes recurred automatically and the third episode of supraventricular tachycardia recurred after intravenous administration of adenosine. During the 38th week of pregnancy, she arrived at the hospital with an automatic rupture of the membranes and the onset of labor. The electrocardiogram showed a sinus rhythm at 80 beats / minute, a shortening of the PR interval and an enlargement of the QRS complex. There were positive delta waves. The echocardiographic examination was without pathological findings. Cesarean section was considered necessary due to the sciatic projection of the fetus. The patient was discharged from our clinic on the fifth postoperative day in good health, with instructions from the team of cardiologists for the subsequent treatment of WPW-associated tachyarrhythmia.

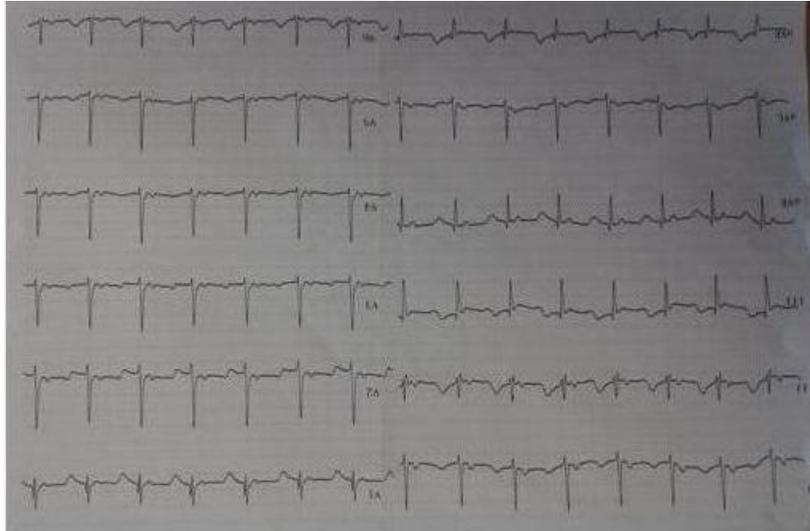
**Keywords:** Wolff – Parkinson – White Syndrome, pregnancy, diagnosis, management, prognosis

## INTRODUCTION

Cardiovascular disease is currently the leading cause of morbidity and mortality in most societies in the Western world, accounting for approximately 31% of reported deaths annually (WHO, 2017; Alawieh et al., 2019). Congenital heart disease is still one of the most common genetic disorders. It is estimated to affect approximately 40000 births per year in the United States (Brown et al., 2020) and includes a wide range of conditions: from the most common hypertrophic cardiomyopathy and familial hypercholesterolemia to the relatively less common hereditary arrhythmia syndromes, such as ventricular tachycardia and Wolff – Parkinson – White syndrome (Ingles et al., 2020). The rapid development in the last decade in the techniques of prenatal diagnosis of hereditary heart diseases is very important for making the most appropriate decisions of modern clinical management of these pregnant women, including

prenatal and postnatal management and recommendations for termination of pregnancy and termination of pregnancy hospitals with pediatric cardiovascular surgery centers (Aydin et al., 2020).

Wolff – Parkinson – White syndrome (WPW) or pre – stimulation syndrome or abnormal atrioventricular stimulation is a congenital cardiac pre-stimulation syndrome characterized by abnormal cardiac electrical conduction through an auxiliary pathway that can lead to symptomatic (Chhabra et al., 2020). The first reference to the characteristics of the syndrome was made in the early 1900s by Frank Wilson and Alfred Wedd. Later in the 1930s, Louis Wolff, Sir John Parkinson, and Paul Dudley White published a series of cases featuring characteristic electrocardiographic changes that formed a separate clinical entity which was later renamed Wolff – Parkinson – White Syndrome (Wilson, 2002; Wolff et al., 2006).



**Figure 1.** Electrocardiographic imaging of a pregnant woman with Wolff – Parkinson – White syndrome (our case).

WPW syndrome is a relatively common arrhythmia with a general prevalence estimated to affect between 1 and 3 cases per 1000 people. The inherited form of the syndrome with a mutation in the PRAKAG2 gene leading to an increase in the prevalence in first-degree relatives is rare and is usually associated with cardiomyopathy (Coban – Akdemir et al., 2020).

### CASE REPORT

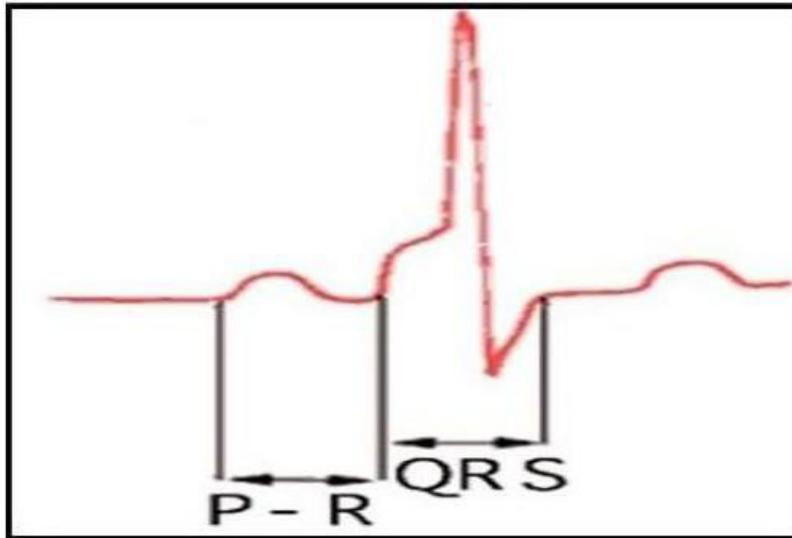
The description of the case concerns a pregnant firstborn aged 30 years, with a history of asymptomatic Wolff – Parkinson – White syndrome diagnosed in childhood, which during pregnancy and up to the 30th week came from the private obstetric clinic to the outpatient clinics of our clinic, reported three episodes of supraventricular tachycardia at a rate of approximately 200 beats per minute. The first two episodes that occurred in the same twenty – four hour period were automatically reversed and the heart rate was automatically converted to sinus rhythm. The next day the pregnant woman had a new episode of supraventricular tachycardia at a rate of about 220 beats per minute which was reversed by intravenous administration of adenosine. Her family history was free. Apart from the pregnancy supplements, she was not taking any other medications.

The pregnant woman, going through the 38th week of pregnancy, came to our hospital with an automatic rupture of the fetal membranes and the beginning of childbirth. From the urgent laboratory test the results were without pathological findings. The electrocardiogram (Figure 1) showed a sinus rhythm with a heart rate of 80 beats / minute, a PR interval of 0.12 seconds and a QRS duration of 0.08 seconds. There were positive delta

waves. ST intervals were normal. The echocardiographic examination was virtually without pathological findings. After the caesarean section, due to sciatic projection of the fetus, a newborn male was born, alive, mature which did not need neonatal support. During the immediate period after the cesarean section, our patient did not have an episode of supraventricular tachycardia. The placenta came out of our clinic itself and the newborn on the fifth postoperative day was well, with instructions from the team of cardiologists for the subsequent treatment of WPW – related tachyarrhythmia.

### DISCUSSION

WPW syndrome is an unusual heart condition characterized by the presence, outside the normal pathway of the atrioventricular and His - Purkinje treatment system, and an abnormal - bypass zone of vaginal tissue, the Kent bundle connecting the sinuses and ventricles and can bypass the atrioventricular node and cause arrhythmias (Deviseti and Pujari, 2016). In women of childbearing potential, the most common arrhythmia is paroxysmal supraventricular tachycardia. Hyperventricular tachycardia during pregnancy is defined as an increase in heart rate greater than 120 beats per minute (Nelson – Piercy, 2002). The exact incidence of WPW syndrome during pregnancy is unknown. However, it is estimated that pregnancy itself may facilitate tachyarrhythmias in patients with a history of asymptomatic stimulation (Robins and Lyons, 2004). The increased adrenergic sensitivity due to the normal increase of estrogen hormones, the increased plasma volume normally observed during a smooth pregnancy and the high incidence of stress that usually



**Figure 2.** Typical electrocardiographic changes of Wolff – Parkinson – White syndrome.

characterizes pregnant women may be some of the causative factors during pregnancy (Kounis et al., 1995).

The diagnosis of the syndrome in pregnant women is based on history, clinical findings and characteristic electrocardiographic lesions. Although in many cases people with a complementary bundle are asymptomatic, having never had a tachycardia, it does not mean that a future risk of a serious, life-threatening arrhythmia can be ruled out. Supraventricular tachycardia is the most common cause of heart arrhythmias in pregnancy. Their clinical course is generally benign. However, because atrial fibrillation can be rapidly transmitted to the abdomen via the adjuvant pathway, life – threatening malignant ventricular arrhythmias can occur that affect both the mother and the fetus, resulting in more frequent respiratory distress and intrauterine growth retardation of the fetus and premature release (Chauveau et al., 2019). In addition, patients with WPW syndrome may experience a variety of other intensely intense symptoms, similar to other supraventricular tachycardia and changes that normally occur during a normal pregnancy, such as palpitations, shortness of breath, decreased endurance, fatigue, chest pain, nausea, dizziness, hypotension, and even severe cardiopulmonary dysfunction (Sengul et al., 2016; van der Steld et al., 2017).

The diagnosis is confirmed by electrocardiogram. The presence of an obvious complementary bundle is accompanied by the presence of characteristic electrocardiographic changes in the sinus rhythm (Figure 2), such as the shortening of the PR interval, the widening of the QRS complex and especially the existence of the wave d (delta). The wave d which may not be apparent in all inductions is the result of the thickening of the initial portion of R or S or QS, due to the slow spread of the stimulus to the first portions of the

ventricular myocardium from the descent of the stimulus through the Kent bailout. The expansion of the QRS complex is proportional to the shortening of the PR interval, so that the duration of the PJ interval (J is the limit between the end of the QRS and the beginning of the ST) remains constant and definitely less than 0.26 seconds (Butt et al., 2018). It is estimated that in some cases, in addition to the typical finding of the short PR interval (<0.12 sec) and the broad QRS complex (> 0.10 sec), the electrocardiogram may show negative Q waves and cause a difficult differential problem with myocardial infarction (Bolognesi, 2016; Ling and Ng, 2018).

The immediate reduction of the incidence of intracranial tachycardia with the participation of the complementary bundle should initially be attempted with the so – called vagotonic manipulations, such as holding the breath, tightening, coughing or massaging the carotid artery. Treating recurrent supraventricular tachycardia associated with WPW syndrome during pregnancy can be difficult, mainly due to the concerns about the effects of pharmacotherapy on the fetus. For those cases where drugs are considered necessary, adenosine is the first treatment option. Adenosine is thought to be effective in rapidly stopping tachyarrhythmias before and during childbirth in pregnant women with WPW syndrome. It is also estimated that it may be equally effective in treating fetal bradycardia resulting from maternal arrhythmia (Afridi et al., 1992; Tak et al., 2012).

In cases of atrial fibrillation or atrial flutter with the descent of stimuli from the bundle, or even in cases of intolerable tachycardia, immediate electrical resuscitation may be required. RF ablation during pregnancy is a safe alternative treatment and should be chosen in cases where tachyarrhythmias pose a real risk to the hemodynamic status of both the pregnant woman and the

fetus and newborn (Domínguez et al., 1999; Kanjwal et al., 2005). At the same time, it is estimated that the method can ensure the permanent and definitive treatment of the patient, with a high success rate in the treatment of WPW syndrome without the requirement of any other future therapeutic intervention (Zheng et al., 2020). However, rare complications such as coronary artery injury during catheter removal, coronary stenosis and pericarditis are likely to occur and should be evaluated with particular caution, especially during pregnancy (Garabelli et al., 2015; Li et al., 2019).

The mode of delivery depends on the intensity and frequency of the symptoms. Normal childbirth in pregnant women with stable hemodynamic status is not a contraindication. Episodes of ventricular tachycardia that occur during childbirth or in the immediate postpartum period can be successfully treated with medication. In the event that a scheduled cesarean section is chosen or is an emergency solution for obstetric indications (our case), epidural anesthesia should be preferred, as it provides the added benefit of hemodynamic stability and postoperative analgesia (Palaria et al., 2013). Neostigmine used as a reversal factor in general anesthesia can cause fatal arrhythmias, causing changes in heart treatment. For these cases, it is estimated that sugammadex, which is safely used today in many areas of daily clinical practice, can be used for caesarean section under general anesthesia in pregnant women diagnosed with WPW syndrome (Sengul et al., 2016).

The prognosis is usually good. Ebstein – related abnormal pregnancy, including WPW syndrome, can be associated with tachyarrhythmias or heart failure (Katsuragi et al., 2013). Analyzing the results of their study, which aimed to evaluate the perinatal management and cardiac outcome of fetuses with tachyarrhythmia or bradyarrhythmia, Hahurij and colleagues showed that the mortality rate is low in patients with supraventricular tachycardia and atrial fibrillation. In patients with atrioventricular block, with relative morbidity including WPW syndrome and other congenital heart defects. The authors conclude that pre-adolescent electrocardiography should be a routine examination in any case of fetal supraventricular tachycardia, as WPW syndrome may occur later in adulthood (Hahurij et al., 2011).

## CONCLUSION

WPW – associated tachyarrhythmia during pregnancy is a serious condition that should be evaluated with extreme caution. Electrocardiographic confirmation of the diagnosis and close monitoring of the pregnant woman to prevent maternal and perinatal morbidity and mortality is essential. Asymptomatic pregnant women or those with mild symptoms usually do not require any treatment. Intravenous administration of adenosine appears to be

the most appropriate and safest treatment option for immediate cessation of tachyarrhythmias in pregnant women with WPW syndrome. DC cardiac conversion, when required, is acceptable at all stages of pregnancy. Normal delivery in pregnant women with stable hemodynamic status should not be a contraindication.

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