Outcomes of Pregnancy in Patients with Preexisting Postural Tachycardia Syndrome

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Background: *Postural orthostatic tachycardia syndrome (POTS) occurs more commonly in women than in men and often affects women of childbearing age. Many of these women wish to have children, yet there are little reported data on the outcomes of pregnancy in patients with POTS. To date there has been one report of two patients with POTS who successfully completed pregnancy. We report the outcomes of 22 women with preexisting POTS who became pregnant.*

Objective: *To assess the outcome of pregnancy in patients with preexisting POTS.*

Methods and Results: *Twenty-two patients, age 30 ± 7 years, with POTS became pregnant. Migraine was the common comorbidity found in 40% of patients. Medications used were β-blockers (18%), midiodrine (31%), selective serotonin reuptake inhibitors (31%), fludrocortisone (13%), combination (40%), and none (18%). During pregnancy, symptoms of POTS remained unchanged in three (13%), improved in 12 (55%), and worsened in seven (31%) patients. One patient who had recurrent episodes of syncope without aura was found to have complete heart block and received a cardiac pacemaker. All patients completed pregnancy successfully. There were no stillbirths. One patient developed hyperemesis. Eighteen patients had vaginal delivery and four patients delivered by cesarian section. No other complications of pregnancy were encountered. Congenital abnormalities were encountered in the form of one atrial septal defect, one ventricular septal defect, and one Down's syndrome. Postpartum symptoms of POTS remained stable in 15 (69%) patients and worsened in seven (31%) patients.*

Conclusion: *Based on our observation, patients with POTS can safely complete pregnancy if they desire to do so. POTS should not be considered a contraindication to pregnancy per se. (PACE 2009; 32:1000–1003)*

postural orthostatic tachycardia, pregnancy, syncope

Introduction

Postural orthostatic tachycardia syndrome (POTS) occurs more commonly in women than in men and often affects women of childbearing age.[1] Many of these women wish to have children, yet there is little reported data on the outcomes of pregnancy in patients with POTS. To date, there has been one report of two patients with POTS who successfully completed pregnancy.[1] We report the outcomes of 22 women with preexisting POTS who became pregnant.

Methods

The study was a retrospective analysis of the patients followed up at the University of Toledo Autonomic Disorder Center. The study was approved by our Institutional Review Board. We identified a total of 22 women with preexisting POTS who were being followed up at our center and who became pregnant. The data of these patients had been collected from 1999 to 2008. During their pregnancies they were seen in the clinic every 2–3 months, in addition to the care provided by their obstetricians. Close contact was maintained between our center and the patients' obstetrical care providers throughout their pregnancies. Patients were also seen in the clinic 1 month postpartum and again at 3–6 months postpartum. Patients' obstetrical and autonomic center data (charts and physician letters) were then carefully reviewed for coexisting conditions, medications, complications during pregnancy or delivery, and the outcome of the patients as well as their infants in the postpartum period. The data obtained are presented as mean ± standard deviation or as percentages where applicable.

Results

Twenty-two women with preexisting diagnosis of POTS who became pregnant were identified for inclusion in the study. The mean age of these women at the time of their pregnancy was 30 ± 7 years. Interestingly, all 22 patients were followed-up by "high-risk" obstetrical care

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centers, as regular obstetrical care providers were unwilling to follow-up these patients. Twenty-one patients had the partial dysautonomic form of POTS and one had the hyperadrenergic form.

Only one patient attempted to become pregnant in the past but had a miscarriage because of factor V Leiden deficiency.

Comorbidity

Eight patients (36%) had a prior history of migraine, two patients (9%) had joint hypermobility syndrome, and two patients (9%) had factor V Leiden deficiency. One of the patients with factor V Leiden deficiency had suffered a miscarriage in the past and one patient had hyperadrenergic form of POTS. Three patients had undergone previous pacemaker implantations.

Medication

During the course of pregnancy four patients (18%) were on no medical therapy. Four patients were on β-blockers (18%), seven (31%) were on midodrine, three on fludrocortisone (13%), seven on serotonin reuptake inhibitors (31%), and nine on combined therapy (40%).

Symptoms of POTS during Pregnancy

During pregnancy three patients (13%) had no reported change in their POTS symptoms. Twelve patients (55%) reported an improvement in symptoms during pregnancy, while seven patients (31%) reported a worsening of symptoms during pregnancy. One patient began to experience episodes of syncope during pregnancy and was found to have periods of complete heart block with ventricular asystole during these episodes. These episodes stopped following a dual-chamber pacemaker implantation. Four patients (18%) experienced a worsening of their symptoms in the first trimester of pregnancy which improved in the second trimester. Three patients (13%) had an increase in their symptoms throughout the course of their pregnancy. One patient had Hyperemesis gravidarum during her pregnancy and was successfully managed with intravenous fluids and Ondansterone.

Each of the patients completed pregnancy successfully. There were no stillbirths or premature or postterm deliveries, and all the infants had a birth weight within the normal range. Four patients (18%) had cesarian deliveries and the remaining 18 (82%) had vaginal deliveries. One child was found to have Down's syndrome (the mother was 37 years of age). One child was noted to have an asymptomatic ostium secundum atrial septal defect, and one was noted to have a small ventricular septal defect (which later closed spontaneously). None of the patients required ambulatory blood pressure monitoring during pregnancy.

Table I.

Summary of Baseline Characteristics and Clinical Outcomes in Patients with POTS and Pregnancy

Age (years)	30 ± 7
Comorbidity	
Migraine	36%
Joint hypermobility syndrome	9%
Factor V Leiden deficiency	9%
Hyperadrenergic POTS	4.5%
Medications	
β-Blockers	18%
Midodrine	31%
Fludrocortisone	13%
Selective serotonin reuptake inhibitors	31%
Combination	40%
None	18%
Symptoms during pregnancy	
Unchanged	3 (13%)
Improved	12 (55%)
Worse	7 (31%)
Symptoms during postpartum period	
Stable	15 (69%)
Worse	6 (27%)
Depression	1 (4.5%)
Obstetrical outcomes	
Cesarian deliveries	4 (18%)
Vaginal deliveries	18 (82%)
Medical complications during pregnancy	
Hyperemesis gravidarum	1 (4.5%)
Advanced heart block	1 (4.5%)
Neonatal outcomes	
Down's syndrome	1 (4.5%)
Ventricular septal defect	1 (4.5%)
Atrial septal defect	1 (4.5%)

Postpartum Period

Fifteen patients reported their symptoms remained stable (69%), while six of seven patients (27%) who had an increase in their symptoms during pregnancy continued to have symptoms in the postpartum period. The patient who gave birth to the child with Down's syndrome developed postpartum depression (which later resolved with counseling and pharmacotherapy).

Table I summarizes the main results.

Discussion

POTS is a type of orthostatic intolerance syndrome characterized by heart rate increases of greater than 30 beats/min (or a rate greater than 120 beats/min) that occurs within the first 10 minutes of standing (or head-up tilt), which occurs in the absence of chronic debilitating disorders or medications that impair autonomic or vascular tone. More complete description of POTS is given elsewhere.[2–6]

POTS often affects young women of childbearing age. Many of these young women wish to have children, yet are apprehensive about the effect pregnancy may have on their POTS and the potential effects of POTS (and medication) on their fetus. The possibility of recurrent syncope in these patients raises concerns about possible maternal (or fetal) injury resulting from falls.[1]

A number of cardiovascular adaptations occur during pregnancy. These include increase in cardiac output retention of sodium and water with increase in blood volume and a reduction in peripheral vascular resistance as well as a decline in diastolic blood pressure.[7,8] The increase in blood volume (affecting plasma and red cell mass) begins around the 4th week of gestation and peaks around the 34th week of gestation.[9–10] Cardiac output increases by an average of 50% above prepregnancy values (principally due to increase in heart rate and stroke volume). Almost 50% of this increase occurs by the 8th week of gestation.[11–13] The cardiac output in pregnant patients is somewhat posture-dependent, especially in the last trimester of the pregnancy. This occurs because the gravid uterus can compress the vena cava while supine, thereby diminishing venous return.[14,15] The normal decline in blood pressure during pregnancy occurs due to a reduction in the peripheral vascular resistance. This reduction is mediated by a decreased responsiveness to angiotensin and norepinephrine[16–18] as well as an increase in endothelial prostacyclin and nitric oxide production as well as reduced aortic stiffness.[19–21]

Of the 22 patients in our study group seven (31%) reported an increase in symptoms (lightheadedness, dizziness, exercise intolerance, syncope, and near syncope) during their pregnancies. Four of these patients experienced the increase in their symptoms solely during the first trimester, while the remaining three had symptoms throughout pregnancy. The improvement in symptoms that occurred in some patients in the later part of pregnancy may have been due to the greater degree of fluid retention that occurs during this period. Glatter et al.[1] report similar findings in POTS patients during the later half of the pregnancy.

In this group of patients with POTS, we observed no major complications during pregnancy, other than the appearance of episodic complete heart block in one patient. The etiology of the heart block in this patient is unclear and may not have been related to POTS. The mother of the child who had Down's syndrome was 37 years of age at the time of the delivery, and advanced maternal age is a well-recognized risk factor for Down's syndrome.[22] We noted no complications that appeared related to pharmacotherapy given to the mother during pregnancy; however, due to a small number of patients followed-up in this study, our data do not reassure that the medications used to treat POTS are safe during pregnancy. The mother of the child with Down's syndrome and the child with ventricular septal defect were on no medications during pregnancy. The majority of the patients had vaginal delivery (81%), and only four patients (19%) had cesarian deliveries. No patient had any delivery-related complications. The cesarian sections were all performed due to obstetrical problems (breech presentation and cephalopelvic disproportion).

Based on both these as well as previously published data, we conclude that women suffering from POTS can complete pregnancy safely if they desire to do so. The presence of POTS should not be a contraindication (in and of itself) to pregnancy. Whether to pursue vaginal versus cesarian delivery should be based solely on obstetrical considerations. All patients in this study completed their pregnancy without any major complications. We recommend that both the primary-care physician and the cardiologist need to work closely with the obstetrician to address any change in symptoms so as to avoid potential maternal or a fetal injury resulting from syncope in these patients.

Limitation

Our study was a retrospective chart review that evaluated the subjective reports about the symptoms during and immediately after the pregnancy. The change in severity of symptoms was not objectively measured by a response to head-up tilt table test. The nature of severity of symptom improvement and/or worsening was again subjective without any information provided about the severity of the symptoms. There was no information about the vasoregulatory responses seen in these patients during delivery, either vaginal or cesarian section.

Another limitation of this study is lack of an age-matched control group of women who were not pregnant. However, despite these limitations we believe that the overall fetal and maternal outcomes in pregnant patients with POTS are reasonably good as we did not encounter any major untoward fetal or maternal problems in this small study. Our conclusion that POTS, in and of itself, should not be considered a contraindication to pregnancy would not be affected by the abovementioned study limitations.

Conclusion

Based on our observation, patients with POTS can safely complete pregnancy if they desire to do so. POTS should not be considered a contraindication to pregnancy *per se*.

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