



Successful pregnancy following heart transplantation: A case report

Dr Stephanie MacDonald, ST7 Resident Anaesthetist

Dr Rachel Darling, Consultant Anaesthetist

The Queen Elizabeth University Hospital, Glasgow



Case Report

A 31 year old primigravida who had undergone a heart transplant in childhood following a viral mediated dilated cardiomyopathy attended the antenatal booking clinic at 8 weeks gestation. She had a permanent pacemaker (VVIR) in situ for complete heart block post-transplant and had previously undergone radiofrequency ablation for atrial flutter. She was well prior to becoming pregnant with good functional status and reported no cardiac symptoms. Baseline echocardiogram showed mild biventricular dysfunction and coronary angiogram demonstrated three vessel allograft vasculopathy. She was on tacrolimus and had started folic acid after finding out she was pregnant. She received no preconception counselling prior to becoming pregnant and her pregnancy was unplanned.

Her pregnancy care was coordinated by the regional cardiac obstetric team with fortnightly multidisciplinary reviews and liaison with her transplant team. Low dose aspirin was started at 13 weeks gestation. Her second trimester was complicated by the development of gestational diabetes for which she was commenced on metformin and recurrence of atrial flutter for which she was commenced on enoxaparin and plans put in place for further management post-partum. Her pacemaker rate was increased from 70bpm to 90bpm to reflect the normal physiological changes associated with pregnancy and her tacrolimus dose gradually increased to maintain desired target levels as her pregnancy progressed. There were no concerns regarding fetal growth throughout her pregnancy.

Despite medical optimization with furosemide, fluid restriction and rest, her left ventricular function gradually deteriorated throughout her pregnancy. A multidisciplinary team decision was made to deliver by planned caesarean birth (PCB) at 31+3 weeks gestation, balancing the risks of prematurity against those of further deterioration in maternal cardiac condition.

Anaesthetic management for her PCB involved invasive blood pressure monitoring, a phenylephrine infusion and a combined spinal epidural anaesthetic as a two separate procedure insertion technique. A conservative spinal local anaesthetic dose was given with intrathecal opiate and the epidural component slowly titrated with levobupivacaine to achieve the desired block height with minimal cardiovascular instability. Her PCB was surgically uncomplicated with minimal blood loss. She remained cardiovascularly stable throughout with cautiously titrated fluids, vasopressors and uterotonics. She gave birth to a healthy baby boy who required a short admission to the neonatal intensive care unit (NICU) whilst she was closely monitored in the obstetric high dependency unit (HDU). Enoxaparin was restarted and enalapril commenced postpartum. Both mum and baby are now at home and doing well.

This case demonstrates a successful pregnancy in a HTR with allograft vasculopathy despite the pregnancy being unplanned and a lack of pre-pregnancy counselling.

Introduction

With improved outcomes following heart transplantation, there is a growing population of heart transplant recipients (HTR) who are of, or surviving to, childbearing age. Whilst the majority of pregnancies following heart transplantation are successful, pregnancy in HTR's are considered high risk and are associated with hypertensive disorders of pregnancy, increased rates of preterm delivery, fetal growth restriction and infants with low birth weights (LBW).¹ Despite this, successful pregnancy outcomes can be achieved with comprehensive and coordinated specialist cardio-obstetric multidisciplinary care that should begin long before conception.

Preconception counseling

Preconception counseling should encompass pregnancy intentions, contraception, timing of conception post-transplant, individualised maternal and fetal risks and psychosocial support. Preconception counseling is of utmost importance in HTR's, especially given the use of teratogenic antihypertensive and immunosuppressant medication in a population in which it is estimated that around half of pregnancies are unplanned.² Preconception counseling allows for adjustment of medications to those with a safety profile compatible with pregnancy and optimisation of co-morbidities and stabilisation of graft function prior to pregnancy. Furthermore, it provides an opportunity to consider genetic counseling for potentially heritable pre-transplant conditions such as genetic cardiomyopathies, as well as initiating a conversation around post-transplant life expectancy which may impact the decision on whether or not to have a baby.



Preconception

- Preconception counseling
- Avoid unplanned pregnancy
- Discuss contraception
- Genetic counseling
- Wait >1 year after transplant to conceive
- Discuss unique risks to mother and baby prior to conception
- Plan transition to medications safe during pregnancy
- Discuss psychological, social and financial concerns

First Trimester

- Take medications that are safe in pregnancy
- Manage comorbid and pregnancy associated conditions
- Early fetal anatomic survey at 11-16 weeks
- Echocardiogram every 1-2 months

Second Trimester

- Continue enhanced monitoring
- Manage comorbid and pregnancy associated conditions
- Closely monitor blood pressure and renal function
- Oral glucose tolerance test to screen for gestational diabetes at 24-28 weeks
- Fetal growth scans every 3-4 weeks
- Monthly echocardiogram from 24 weeks until delivery

Management during pregnancy

Antepartum

Pregnancies in HTR's are high risk and require a co-ordinated multidisciplinary team approach to achieve good outcomes, including an experienced cardio-obstetric team as well as the HTR's transplant team to assist with the monitoring of allograft function, management of comorbidities and adjustment of immunosuppressive and antihypertensive medication. Calcineurin inhibitors serve as the cornerstone of maintenance immunosuppressive regimens during pregnancy and mycophenolate products should stop prior to planned conception. Comorbid conditions such as diabetes and hypertension are more prevalent in HTR's, as is the development of preeclampsia and gestational diabetes. Low dose aspirin is advised from 13 weeks gestation and screening for gestational diabetes recommended at 24-28 weeks gestation. Infections should be actively screened for and treated.

Peripartum

In the absence of maternal or fetal deterioration, pregnancy can be continued until 39 weeks gestation. After which labour induction should be considered as per local guidelines. Caesarean birth is usually reserved for obstetric indications or intractable cardiac complications. Caution is advised with oxytocin given the risks of vasodilatation, tachycardia and ischaemia. Ergot alkaloids should be avoided if the patient has hypertension and otherwise used with extreme caution in HTR's. Labour epidural analgesia is recommended to reduce the physiological stress response associated with the pain of labour, which helps to stabilise heart rate and blood pressure, and may reduce the risk of severe maternal morbidity.³

Postpartum

ICU and/or HDU care is recommended in the immediate postpartum period due to the increased risk of cardiovascular events at this time. It also allows for close monitoring of immunosuppression, thromboprophylaxis and blood pressure. The safety of immunosuppressive and antihypertensive medication whilst breastfeeding should be carefully considered. Whilst it is advised to discontinue ACE inhibitors prior to conception, captopril and enalapril can be used post pregnancy during lactation due to their low rate of transfer into breastmilk.⁴

Third Trimester

- Continue enhanced monitoring
- Manage comorbid and pregnancy associated conditions
- Closely monitor blood pressure and renal function
- Establish peripartum care plan
- Monthly echocardiogram

Delivery

- Aim to continue pregnancy until 39 weeks in absence of maternal or fetal deterioration
- Caesarean delivery ideally reserved for obstetric indications or intractable heart failure
- Appropriate analgesia for delivery
- Caution with uterotonics
- ICU/HDU care

Postpartum

- Discuss safety of medications during breastfeeding
- Transition back to prior stable immunosuppression regime
- Close monitoring for hypertensive disorders
- Return to pre-pregnancy state
- Discuss psychological, social and financial concerns

High dose folic acid

Low dose aspirin from 13-16 weeks and monthly echocardiogram from 24 weeks until delivery

Pregnancy outcomes in heart transplant recipients

The Transplant Registry International (TPRI) is a voluntary international registry of solid organ transplant recipients who become pregnant and comprises one of the largest reported series of pregnancies in HTR's. TPRI data demonstrates that 69% of pregnancies reported by HTR's are successful with no neonatal deaths.² The miscarriage rate of 25% is comparable to that of the general population, though occurs much more frequently in pregnancies exposed to mycophenolic acid. Hypertensive disorders of pregnancy, LBW infants and premature birth are more prevalent in HTR's, though the majority of preterm births are iatrogenic due to clinical deterioration of maternal and/or fetal health.⁴

Primary graft failure is a major cause of morbidity after heart transplantation, typically occurring within the first three years following transplantation. Chronic kidney disease and cardiac allograft vasculopathy are significant contributors to long term mortality after heart transplantation, with almost a third of HTR's developing severe renal dysfunction and almost half diagnosed with allograft vasculopathy 10 years post-transplant.⁴ It is difficult to draw conclusions on the role of pregnancy on morbidity and mortality in HTR's from currently published data, though recent TPRI data has shown no negative impacts of pregnancy on post-transplant survival.⁵

Discussion

Pregnancy after heart transplantation has progressed from a situation where termination was often advised to one of likelihood of success. Preconception counseling, tailoring of medication and monitoring of co-morbidities and allograft function by an experienced cardio-obstetric multidisciplinary team is essential to optimise cardiac function, avoid rejection, avoid teratogenic complications and achieve favourable pregnancy outcomes. Pregnancy in HTR's should be a well thought out decision, balancing the profound aspiration of becoming a parent with the significant risks pregnancy poses to the mother, transplant and fetus.

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Obstetric
Anaesthetists'
Association



stephanie.macdonald5@nhs.scot
 www.nhs.ggc.scot