Case Report

Pregnancy in a Patient with Congenital Complete Transposition of Great Arteries after Atrial Switch Operation: A Case Report with a Review of Literatures

Jung Un Shinn¹, Hyun Hwa Cha*¹, Yeo Hyang Kim² and Won Joon Seong¹

¹Department of Obstetrics and Gynecology, Kyungpook National University Hospital, South Korea
²Department of Pediatrics, Kyungpook National University, South Korea

Received: July 22, 2018; Published: July 30, 2018

*Corresponding author: Hyun Hwa Cha, Department of Obstetrics and Gynecology, Kyungpook National University Hospital, School of Medicine, Kyungpook National University 807 Hoguk-ro, Buk-gu 702-720, Daegu, South Korea.

Abstract

Complete transposition of the great arteries (d-TGA) accounting for 5% of all congenital heart disease (CHD) is one of the most common cyanotic CHDs. Advances in congenital cardiology and surgery improve the prognosis in patients with TGA, nowadays women who survived the disease are entering the child bearing ages. Although, arterial switch operation has been becoming the standard treatment for TGA, atrial switch operation (ASO) was performed till past decades. Right ventricle (RV) becomes to be in charge of systemic circulation in patients with ASO. RV cannot sustain the demands of the systemic circulation and gradually decrease the function. Recently, we have experienced a pregnancy in a patient with congenital TGA treated with ASO. She uneventfully delivered a male neonate weighing of 3100 grams at 38 weeks of gestation. However, she developed the sign of heart failure on four days after delivery. We successfully managed her with administration of oxygen, diuretics and angiotensin converting enzyme (ACE) inhibitor. Herein, we report this case with a review of literatures.

Abbreviations: CHD: Congenital Heart Diseases; ASO: Atrial Switch Operation; RV: Right Ventricle; ACE: Angiotensin Converting Enzyme; SVR: Systemic Vascular Resistance; TR: Tricuspid Regurgitation; NYHA: Heart Association; MRI: Magnetic Resonance Imaging; USG: Obstetrical Ultrasonography; FS: Fractional Shortening; ICU: Intensive care unit; CSE: Combined Spinal and Epidural; PACU: Post Anesthesia Care Unit; SVC: Superior Vena Cava; IVC: Inferior Vena Cava

Introduction

Congenital heart diseases (CHD) is one of the most common congenital anomalies with an incidence of about 8/1000 live births [1]. Complete transposition of great arteries (d-TGA) is a relatively frequent cardiac anomaly occurring in 5% to 7 of all congenital cardiac malformations [2]. Since its spontaneous mortality within the first 2 years is 90% without surgical intervention, almost all pregnant women with TGA have undergone one form of the surgical repairs such as atrial switch operation (ASO), arterial switch operation or extra conduit repair (Rastelli) [3]. Although ASO can restore a physiologic circulation, the morphological RV should sustain the systemic circulation [3,4]. Physiologic hemodynamic changes during pregnancy, delivery and immediate postpartum period could result in deteriorating of systemic RV functions and/or tricuspid valve regurgitation [4]. Herein, we aimed to report a case of pregnancy with congenital TGA treated with ASO.

Case Presentations

A 28-year-old woman (gravida 1, para 0) visited our institution for antenatal care. She was diagnosed as complete TGA postnatally and had undergone balloon atrial septostomy after birth, and subsequently underwent Senning’s operation at the age of 1-year-old. She has been administered angiotensin converting enzyme (ACE) inhibitor. Herein, we report this case with a review of literatures.
of heart failure (Figure 2) and performed carefully obstetrical care. 
2D echocardiography performed at 373/7 weeks revealed that 
decreased RV function compared to previous study (FS 22%). There 
was no significant event during antepartum period. We discussed 
about the mode of delivery with the pediatric cardiologist and 
obstetrical anesthesiologist. We thought that elective delivery 
would be better; therefore, we decided to perform cesarean delivery 
at 381/7 weeks of gestation.

Figure 1: Maternal 2D echocardiography showed that 
functional fraction of the maternal right ventricle was 35%.

Figure 2: he levels of maternal NT-Pro-BNP during 
antepartum period. They remained stable during the 
pregnancy.

A male neonate was born weighing 3100 gram with Apgar score 
8 and 9 in 1-minute and 5-minutes. The anesthesiologist chose 
combined spinal and epidural (CSE) method to avoid a sudden 
change in blood pressure. An arterial cannulation was established 
at her right radial artery for close monitoring of blood pressure 
and continuous cardiac output. Her blood pressure maintained 
the range of 110-120/69-85 mmHg during systolic and diastolic 
period, respectively. Also, continuous electrocardiogram showed 
normal sinus rhythm without arrhythmia at operative room and 
post anesthesia care unit (PACU). However, her postoperative NT-
proBNP levels started to increase abruptly on 3rd day after delivery.

Figure 3: The levels of maternal NT-Pro-BNP during 
postpartum period. Her postoperative NT-proBNP levels 
started to increase abruptly on 3rd day after delivery.

Discussion

Atrial switch operation (ASO) includes the “Senning operation” 
introduced in 1957 and the “Mustard operation” introduced in 
1964 [5]. Senning operation created a conduit that routes the 
deoxygenated blood from the superior vena cava (SVC) and inferior 
vena cava (ICV) into the mitral valve and left ventricle [5]. By contrast, 
Mustard operation excised the atrial septum and created a baffle 
out of prosthetic material in 1963 [5]. Since these methods force 
the morphological RV to act as systemic pump, pregnant women 
who performed ASO would be at high risk during their pregnancies 
[6]. Pregnancy is usually related with prominent hemodynamic 
changes including increase of stroke volume, plasma volume, heart 
rate and cardiac output [6]. Although, studies about the obstetrical 
and cardiac outcomes in women with ASO are limited due to the 
rarity of this situation, previous studies reported that ASO would 
be related with obstetrical complications including preterm birth, 
intrauterine growth restriction and cardiac complication such as 
deterioration of RV function, arrhythmia, or deterioration of NYHA 
functional classification [7, 8].

One of the most common cardiac complications in women 
with ASO is arrhythmia such as sinus node dysfunction, atrial and 
ventricular tachyarrhythmia, which occurs with 14% - 20% of 
incidence [6, 8]. In addition to atrial scar formed during atrial repair, 
increased circulatory burden during pregnancy would be one of the 
trigger factors [5,8]. Therefore, arrhythmia should be concerned 
in pregnant patients with ASO. Though other cardiac complications 
are known to be uncommon, RV failure with progressive tricuspid 
regurgitation was developed in 10-25% of pregnant women with 
ASO [4, 7]. The ventricular pressure over time (dP/dt) is an indirect 
measure of the force of the ventricle that requires the presence of 
some degree of TR to be assessed contraction. It is more reliable 
methods for qualifying systemic RV function [7] but we assessed the 
RV function by Tei and FS due to her poor echo window. Meanwhile,
baffle obstruction is also important cardiac complication. Overall the rate of baffle obstruction was known to be 5% after ASO [9]; however, the rate of baffle obstruction during pregnancy in patent with ASO was 36% [7].

Therefore, the authors suggested that even if a patient has no symptom, screening for baffle obstruction is necessary before a pregnancy. And baffle stenting should be considered before pregnancy for any degree of baffle narrowing, because obstruction is likely to worsen during pregnancy [9]. It is not clear which factors determine the prognosis of pregnant women with ASO. We suggested that early age, stable NYHA functional class (I or II) and normal levels of NT-proBNP would be good prognosis factors. A previous report also showed that patients whose NT-proBNP level was higher than 200 pg/mL were more likely to have higher right ventricular diameter, or more likely to be under diuretic treatment [10]. In conclusion, we thought that a pregnancy could be manageable in some kind of patients with ASO. The careful obstetrical and cardiologic management are needed.

References

1. Abu Harb M, Hey E, Wren C (1994) Death in infancy from unrecognised congenital heart disease. Arch Dis Child 71(1): 3-7.
2. Abuhamad A, Chaoui R (2015) Diagnosis and management of adult congenital heart disease Curr Hlth Livingstone pp. 447.
3. Trigas V, Nagflyman N, Pildner von Steinburg S, Oechslin E, Vogt M, et al. (2014) Pregnancy-related obstetric and cardiological problems in women after atrial switch operation for transposition of the great arteries. Circ J 78(2): 439-443.
4. Niwa K [2018] Adult Congenital Heart Disease with Pregnancy. Korean Circ J 48(4): 251-276.
5. Haefele C, Lui GK (2015) Dextro-Transposition of the Great Arteries: Long-term Sequelae of Atrial and Arterial Switch. Cardiol Clin 33(4): 543-558.
6. Cataldo S, Doohan M, Rice K, Trinder J, Stauart AG, et al. [2016] Pregnancy following Mustard or Senning correction of transposition of the great arteries: a retrospective study. BJOG 123(5): 807-813.
7. Metz TD, Jackson GM, Yetman AT [2011] Pregnancy outcomes in women who have undergone an atrial switch repair for congenital d-transposition of the great arteries. Am J Obstet Gynecol 205(3): 273.e1-5.
8. Drenthen W, Pieper PG, Ploeg M, Voors AA, Roos-Hesselink JW, et al. [2005] Risk of complications during pregnancy after Senning or Mustard (atrial) repair of complete transposition of the great arteries. Eur Heart J 26(23): 2588-2595.
9. Wells WJ, Blackstone E [2000] Intermediate outcome after Mustard and Senning procedures: A study by the Congenital Heart Surgeons Society. Semin Thorac Cardiovasc Surg Pediatr Card Surg Annu 3: 186-197.
10. Martinez Quintana E, Marrero Negrin N, Gopar Gopar S, Rodriguez Gonzalez F [2017] Right ventricular function and N-terminal pro-

ISSN: 2574-1241
DOI: 10.26717/BjSTR.2018.07.001491
Hyun Hwa Cha. Biomed J Sci & Tech Res

This work is licensed under Creative Commons Attribution 4.0 License
Submission Link: https://biomedres.us/submit-manuscript.php

Cite this article: Hyun Hwa C, Jung Un S, Yeo Hyang K, Won Joon S. Pregnancy in a Patient with Congenital Complete Transposition of Great Arteries after Atrial Switch Operation: A Case Report with a Review of Literatures. Biomed J Sci&Tech Res 7(3)- 2018. BJSTR. MS.ID.001491. DOI: 10.26717/ BjSTR.2018.07.001491.

Assets of Publishing with us

- Global archiving of articles
- Immediate, unrestricted online access
- Rigorous Peer Review Process
- Authors Retain Copyrights
- Unique DOI for all articles

https://biomedres.us/