

Is Multiple Pregnancy Really a Risk Factor? Fetal Echocardiography Results in Tertiary Care Center

Running head: Multiple Pregnancy and Fetal Echocardiography

Abstract

Objectives: The aim of this study was to analyze the frequency and results of congenital heart defects (CHD) in multiple pregnancies by fetal echocardiography.

Method: This retrospective study was conducted at our hospital between January 2016 and September 2019. A total of 9440 pregnant women were enrolled in this study, including 241 were multiple pregnancies. (232 twins, 7 triplets and 2 quadruplets).

Results: The prevalence of CHD was significantly higher in twin pregnancies ($p=0.05$). The rate of CHD was present in singletons 4.31% and twins 8.7%. There was no statistically significant difference between the two groups with respect to rate of critical congenital heart disease ($p=0.32$).

Conclusion: Multiple pregnancies had increased congenital heart defect risk compared with singleton. Therefore, it is important to refer for fetal echocardiography when necessary.

Key words: congenital heart defect; fetal echocardiography, ultrasound

1. INTRODUCTION

Congenital heart defects (CHD) are the most common birth defects and most important cause of anomaly-related mortality during infancy.^{1,2,3} Recent developments in fetal echocardiography has made it possible of feasible and highly accurate prenatal diagnosis of congenital heart disease in appropriate settings.^{4,5}

Multiple births accounts for 1-2% of all pregnancies, and its incidence has been increasing gradually, possibly as a consequence of increased usage of assisted reproductive technologies.⁶ The rate of congenital malformations was reported higher in twin pregnancies compared with single pregnancies.^{7,8,9,10} Congenital heart defects are most common congenital anomaly, the incidence is 8:1000 live births.² The incidence of congenital heart defects in multiple births was reported as 20:1000 live births.⁵ Several studies reported the risk of heart malformations to be 4 to 9-fold in monozygotic twin pregnancies.^{10,11,12,13}

This study aims to evaluate the prevalence of CHDs in singleton versus multiple pregnancies. We also aimed to evaluate the type of congenital heart disease and the neonatal outcome in this cohort.

2. MATERIALS-METHODS

The study was a retrospective analysis of pregnant females referred to the pediatric cardiology unit in our hospital, for fetal echocardiography from January 2016 to September 2019. The study was approved by the local ethical committee. All participants provided written consent. For all cases, the following parameters were retrieved from our database: Age, gestational age, final diagnosis, fetal number, chorionicity, gestational age at the time of examination and echocardiography results after birth were recorded. Infants of mother with missing information were excluded. Cases who were diagnosed after as patent foramen ovale and patent ductus arteriosus were not included. Data on chorionicity is based on the prenatal ultrasound diagnosis. Our primary outcome in this study was the total number of congenital heart disease which were seen on fetal echocardiogram of multiple pregnancies. Secondary outcomes evaluated the number of critical congenital heart disease (CCHD) in singleton and multiple pregnancies. CCHD included hypoplastic left heart syndrome, common arterial trunk, coarctation of the aorta, interrupted AA, pulmonary atresia with intact septum, tetralogy of Fallot, total anomalous pulmonary venous return, d-transposition of great arteries, tricuspid atresia, double outlet right ventricle, Ebstein's anomaly, and single ventricle.

2.1. Fetal Echocardiography

Fetal echocardiography procedure was routinely performed on patients who applied to perinatology. All of the fetal echocardiography examinations were performed by experienced four pediatric cardiologist in our center. Fetal echocardiography was performed on all the cases during gestational weeks 18 to 37. The fetal heart scan was performed with the woman in a supine position, tilted 15° to the left. The study patients had a detailed transabdominal fetal echocardiography with a full assessment of cardiovascular structural anatomy and function according to the guidelines of the American Institute of Ultrasound in Medicine.¹⁴

The following echocardiography machines were used.

Philips Affiniti 50 (Philips Healthcare, Andover, Netherlands) equipped with C5-1 MHz transabdominal curvilinear transducers or;

Philips Epiq C7 (Philips Medical Systems, Bothell, WA, USA; 2014) equipped with C5 MHz transabdominal curvilinear transducers.

A detailed and complete echocardiographic examination was performed in every case, including biometric measurements along with a thorough and sequential scanning and identification of each view: 4-chamber view, 3-vessel view, trachea and 3-vessel view, outflow tract view, and aortic and ductal arches view. All ultrasound physicians strictly followed the standard guidelines for scanning and diagnosis of heart malformations.

2.2. Statistical analysis

All statistical analysis was performed using SPSS 21.0 (SPSS Inc., Chicago, IL); $p < 0.05$ was considered statistically significant. Continuous data were expressed as mean value \pm standard deviation (SD). Numbers and percentages of congenital heart lesions in singleton and multiple pregnancy groups were calculated. Comparison between the two groups were performed using chi-square test.

3. RESULTS

Fetal echocardiography was performed in 9440 cases. Of these, 241 were multiple pregnancies and 9199 were singleton pregnancies. Of multiple pregnancies, 96.3% were twin, 2.9% were triplet and 0.8% were quadruplet. The mean maternal age in the study was 30.5 ± 5.8 years (16-47 years), and the mean gestational age at referral was 22.3 ± 3.8 weeks. There were 418 cases of CHD delivered during the study period: 397 singletons (4.31%). and 21 twins (8.7%). The prevalence of CHD was significantly higher in twin pregnancies ($p = 0.005$). There was no statistically significant difference between the two groups with respect to rate of critical congenital heart disease ($p = 0.32$). Most

common cardiac lesion identified in both groups was ventricular septal defect. Cardiac lesions which were identified in singleton and twin pregnancies are summarized in Table-1 and Table-2. The relation of chorionicity and the presence of CHD are shown in Table-3.

Trisomy 21 was detected in two of the twin pregnancies and intrauterine death developed in 10 fetuses. Of the twins with CHD identified prenatally, 13 patients were born in our centre. Fetal echocardiography prenatal diagnosis of twins was all the same except in one case who had hypoplastic left heart syndrome which was originally had single ventricle diagnosis. Of these cases, one with unbalanced atrioventricular septal defect died due to sepsis, two cases with hypoplastic left heart syndrome died after Stage 1 repair.

DISCUSSION

In this retrospective study, the prevalence of CHD was significantly higher in multiple pregnancies when compared to singleton pregnancies. Data regarding the prevalence of CHD in twin pregnancies are lacking in our country. The rate of CHD was 8.7% in multiple pregnancies and 4.31% in singleton pregnancies. Herskind et al.¹⁵ studied 25-year data of 41525 twin pregnancies in Denmark. The prevalence of CHD was 1.4% in twin pregnancies, and 0.87% in 74773 singleton pregnancies in their study, concluded that twin pregnancies increased the rate of CHD. Best et al.⁶ studied the prevalence of CHD of twin and singleton pregnancies in North England between 1998-2010, they found that congenital heart defects are more significantly more prevalent in twin pregnancies with a rate of 1.3%, and CHDs are more common in monochorionic twins compared to those of dichorionic.

In this study, the prevalence of CHD was 11.7% in monochorionic twins and 10.1% in twins with dichorionic twins. The review of Bahtiyar et al.¹² found that the prevalence of CHD in monochorionic/diamniotic gestations were increased nearly nine-fold and 40 CHD patients were found in 830 twin pregnancies. The current study confirms that monochorionic/diamniotic twin pregnancies were associated with CHD and further support the idea that fetal echocardiography should be necessary for all MC/DA twin pregnancies.

In the current study, the prevalence of CHD in twin pregnancies was higher than those in prior population based studies. A possible explanation for this might be that our population were tertiary center-based and from patients who had fetal echocardiography indication. This finding is consistent with that of Hui et al. who found that the prevalence of CHD was 7.3/1000. They also noted that of 12 patients, 4 were high-risk and 8 were low-risk.¹⁶

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Table legends:

Table 1. Cardiac lesions identified in single pregnancy

Table 2. Cardiac lesions identified in multiple pregnancy

Table 3. CCHD distribution in the groups

