Commentary

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Insights in Biomedicine
ISSN 2572-5610

2019
Vol.4 No.1:5

DOI: 10.36648/2572-5610.4.1.56

Congenital Heart Defects

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Received: February 07, 2019; **Accepted:** February 15, 2019; **Published:** February 20, 2019

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Citation: Sharma V (2019) Congenital Heart Defects. Insights Biomed Vol.4 No.1:5

Commentary

A congenital heart defect (CHD) is a structural defect of the heart or the great vessels by birth, which severely affects cardiac function [1]. CHDs are the commonest form of abnormalities seen in newborn babies, affecting 1 in 145 live births (British Heart Foundation). The most common CHD is a ventricular septal defect (VSD), which occurs to varying degrees in around 3570 per million live births (around 3.5/1000). Small VSDs, along with atrial septal defects (ASDs) and small patent ductus arteriosus (PDA) are considered the least severe CHDs, and usually close naturally or do not cause problems to the patient [2]. The most severe CHDs include double outlet right ventricle (DORV), persistent truncus arteriosus (PTA), transposition of the great arteries (TGA), tetralogy of fallot (TOF), atrioventricular septal defects (AVSDs), and large VSDs. These occur collectively at a rate of around 2.5-3 per 1000 live births and cause patients to become seriously ill within the immediate postnatal period, or soon after [2].

There are a lot of defects which can be classified under CHDs, but to make it easy to understand, CHDs can be divided into 3 main categories – Cyanotic heart disease, Left sided obstruction defects, and septation defects [3]. Cyanotic heart diseases are those in which the baby looks blue because of mixing of deoxygenated and oxygenated blood. In left sided obstruction defects, there is an obstruction or defect in the left side of the heart and septation defects involve any defect in different septums present in heart like ventricular septum, atrial septum or atrioventricular septum. Different defects under these categories are summarized in **Figure 1**. In these, defects of cardiac valves and their associated structures (25-30% of all defects) septation defects and outflow tract (OFT) defects are of prime concern because of the relative high occurrence [3,4].

In the past, genetic studies of families with multiple affected individuals have provided insights into the genetic basis of several CHDs, such as atrial septal defect or patent ductus atrieosis [5,6]. To pinpoint the genesis of CHDs it is important to understand the embryological processes during heart development and how dysregulation at any step on its own or in combination may lead to CHDs. Although the major cause of CHDs can be attributed to the genetic contribution, there have been reports that genetic predisposition of an individual can interact with the environment and cause CHDs [7]. For instance, exposure to angiotensin-converting-enzyme inhibitors at prenatal stage can increase the risk of developing congenital malformations including those related to heart [8]. However, the environmental factors are more of the risk factors and to comprehend the mechanism underlying CHDs it is crucial to understand the developmental genetics of heart.

Medical care has increased and developed immensely and there have been tremendous advances in diagnosis and treatment of CHDs, however knowledge about the causes of CHDs is limited, although cardiovascular genetics is rapidly expanding. Determining the possible causes will help in understanding the pathobiological basis of these problems and define disease risk, which will lead to prevention. Hence, a major goal for the biomedical profession is to design preventive measures that can be taken in the pre-conceptual period and this is an area of active

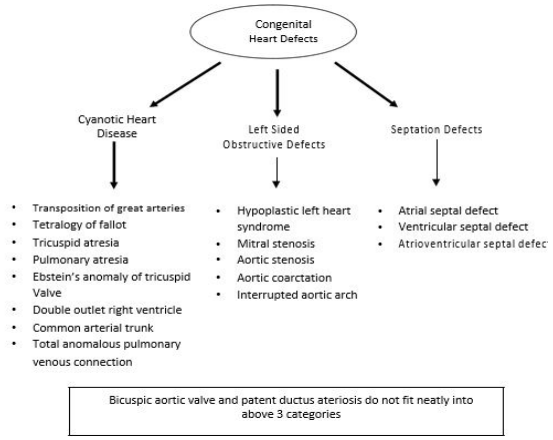

Figure 1 Classification of different congenital heart defect [3].

research. Over the years, greater insights have been provided into the development of the cardiovascular system with the genes and signaling cascades involved in cardiovascular defects, although, there is still a lot to be understood. Therefore, it is necessary to fully understand normal development in order to unravel the aetiology of congenital cardiovascular defects and to develop therapies.

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