**Abstract**

Congenital heart diseases are associated with various congenital musculoskeletal abnormalities. Many of them are well described. Knowledge of these external manifestations helps in early identification of various congenital heart defects. Holt and Oram described association of radial aplasia with atrial septal defect. We report an interesting case of a young girl who presented with bilateral radial aplasia, absent thumb and abnormal carpal bones with atrial septal defect. Many variations in the presentation of Holt Oram syndrome have been described in literature.

**Key-words**

Holt Oram Syndrome, Congenital Heart Disease, Atrial Septal defect.

**Key Messages**

Holt Oram syndrome or atriodigital dysplasia is a congenital syndrome of radial aplasia with congenital heart disease most commonly ostium secundum atrial septal defect.

**Introduction**

Congenital heart diseases are associated with various congenital musculoskeletal anomalies. Knowledge of these external manifestations helps to identify it easily and also predict the possible underlying heart disease. We report one such syndrome first reported by Mary Clayton Holt and Samuel Oram in 1960. The prevalence of this disorder has been estimated to be 0.95 per 100,000 total births; 85 percent of cases are attributed to new mutations of the transcription factor TBX5. Holt Oram Syndrome (HOS) is an autosomal dominant inheritance is commonly associated with Ostium secundum atrial Septal defect (ASD); less frequently with ventricular septal defect (VSD) and ostium primum ASD.

**Case History**

A 13 year old girl was brought to our hospital with history of palpitations and intermittent exertional chest pain for past two years. On examination the patient had absent thumb and radius bilaterally (Figure 1). Cardiovascular examination revealed a precordial bulge. There was a wide fixed split of the second heart sound, with an ejection systolic murmur at the pulmonary area. Rest of the examination was unremarkable. Radiograph of the hands and forearms (Figure 1) revealed absent radii, abnormal carpal bones, absent 1st metacarpals and phalanges bilaterally. Electrocardiographic examination (Figure 2) showed a right bundle branch block with right axis deviation, T inversion in anterior leads and enlargement of right atrium. Transthoracic echocardiographic examination (Figure 3) confirmed the presence of a large ostium secundum atrial septal defect measuring 3.2 cms. Based on the above features a diagnosis of HOS was made. Congenital heart diseases are associated with various syndromes. The external manifestations of these syndromes help to identify it and also predict the possible underlying heart disease.
Case Report

Discussion

Holt and Oram first described this condition in 1960 in a 4-generation family with atrial septal defects (ASDs) and thumb abnormalities. It is an autosomal dominant condition, with near complete penetrance caused due to the mutations of the transcription factor TBX5. The Holt-Oram syndrome or atriodigital dysplasia is familial in 60% cases and sporadic in the rest. The characteristic clinical features are involvement of upper limb and the heart. Upper limb involvement can be unilateral or bilateral, usually asymmetric involving radial, carpal and thenar bones in the form or aplasia, hypoplasia or mal development. Cardiac involvement is seen in three quarter of the patients and manifests as ASD, VSD, peripheral pulmonary stenosis, conduction defects, atrioventricular blocks or atrial fibrillations. A case of familial HOS associated with interrupted type B aortic arch diagnosed prenatally was reported from Hong Kong. More than 30% of patients with HOS show no anatomical heart abnormalities and manifest only electrocardiographic abnormalities. Heart-hand syndromes show substantial clinical and genetic heterogeneity. Saura et al reports an unusual case of a patient with a heart-hand syndrome consisting of preaxial polydactylia, postaxial syndactylyia, parachute mitral valve, mild sub aortic stenosis, and double outlet right ventricle.

In a series of congenital cardiovascular disorders from Chennai, India; Down, Noonan, Di George, and Holt–Oram syndromes were the commonest. They constituted 56.8% of the total.

Radial aplasias and hypoplasias of the upper limb constitute a wide variety of presentations. The defect though most prominent in the bones can be associated with associated deficiency of soft tissue structures. Though lower limb anomalies are the exception than the rule in HOS, a family with a novel mutation and feet anomalies was reported from Hong Kong.

Legends

**Figure - I**

Photograph showing absent thumbs bilaterally. X ray shows the absent radial bones, abnormal carpal bones and absent thumb.

**Figure - II**

Electrocardiogram showing right axis deviation, right bundle branch block with rsR' pattern in V2, T wave inversion in anterior leads.

**Figure - III**

Transthoracic echocardiogram showing an ostium secundum atrial septal defect.
All patients presenting with Holt Oram syndrome or any other congenital syndromes should be evaluated for associated anomalies in other organ systems. Management of these patients involves correction of the cardiac lesion by catheter based or open approaches and orthopaedic correction of the limb abnormalities.

References