Congenital Heart Disease in Radial Clubbed Hand Syndrome

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Simcha, A. (1971). *Archives of Disease in Childhood*, **46**, 345. **Congenital heart disease in radial clubbed hand syndrome.** A study has been made of children born with radial clubbed hands, with reference to the incidence of coexisting congenital heart malformations. In this series of 61 patients with radial clubbed hands 8 had proven heart disease, with a wide variety of congenital cardiac defects.

Thalidomide ingestion was known to have occurred in 9 cases, but may well have been causative in a larger number. But in those cases of radial clubbed hand associated with congenital heart disease, thalidomide appeared not to be causative.

The association of forearm abnormalities and congenital heart disease is well documented, and since first noted by Kato in 1924 has been reported by many others (Nadas, 1966; Wood, 1968). A hereditary syndrome of congenital heart disease with forearm and hand abnormalities has also been described by Holt and Oram (1960).

Harris and Osborne (1966) suggested that the anomaly of radial clubbed hands (RCH), i.e. congenital absence or hypoplasia of the radius, may be associated with ventricular septal defect and pulmonary hypertension, and this entity was named by them the 'ventricolo radial syndrome' (Fig. 1 and 2).

In our own material at The Hospital for Sick Children, London, we have noted this skeletal anomaly to be associated not only with ventricular septal defect, but also with other forms of congenital heart disease, as well as with severe anomalies in body systems.

Clinical Findings

Sixty-one children with RCH were referred to this hospital during the years 1946–1969; 32 of them were born during the years 1960–1962 (Fig. 1). Those were the years when most of the thalidomide babies were born in the United Kingdom (Ministry of Health, 1963), but only 9 out of the total 61 patients had an indisputable history of thalidomide taken during pregnancy by their mothers, and though thalidomide is known to

cause congenital heart disease (Lenz, 1962; Pfeiffer and Kosenow, 1962), none of these 9 patients had congenital heart disease.

Eight children were found to have congenital heart disease; 5 of these were investigated by cardiac catheterization and angiocardiology. In 4 patients the final diagnosis was made at necropsy, and in 1 patient only was the diagnosis made on clinical grounds.

Six other patients who were suspected of having heart disease at an earlier stage of their life and in whom a heart murmur was detected, were re-examined and found to have normal hearts. One patient who presented with the clinical auscultatory findings of pulmonary valve stenosis was catheterized and found to have a normal heart.

Of the 8 patients with heart anomalies, 4 showed in addition abnormalities of the gastrointestinal or genitourinary systems (Table I). The genitourinary tract anomalies were horseshoe kidney in 1 case and unilateral cystic kidney in the other. The high incidence of urinary tract anomalies in children with congenital heart disease was reported earlier from this hospital, with special reference to Fallot's tetralogy (Chrispin and Lillie, 1966). The gastrointestinal tract anomalies in these 4 patients were oesophageal atresia, duodenal atresia, annular pancreas, anal atresia, and imperforate anus.

The congenital heart anomalies consisted of: persistent ductus arteriosus in 2, transposition of the great vessels in 1, atrial septal defect in 2, ventricular septal defect in 4, and pulmonary atresia in 1 patient. Most of the heart anomalies were complicated with more than one anomaly.

FIG. 1.—Year of birth of 61 patients with radial clubbed hand.

Two of the VSDs had high pulmonary artery pressures, and 1 of them died from a complication preceding the surgical repair of his ventricular septal defect. Three of the patients with complicated forms of heart disease combined with other body anomalies died in their neonatal period.

Detailed findings in the 8 RCH patients with

abnormal hearts combined with other body anomalies are given in Table I.

Discussion

This series shows that the RCH syndrome is a skeletal anomaly commonly associated with other body abnormalities (Table II). Of the 61 patients

TAB I
Clinical Data of Patients with Radial Clubbed

Case No.	Date of Birth and Sex	Prenatal History	Skeletal Abnormalities	Other Body System Abnormalities	
1	17.8.61 Died 19.8.61	M	Pre-eclampsia ante-partum haemorrhage	Bilateral RCH radial deviation of wrist, 2 digits left hand, 4 digits right hand	Imperforate anus; Meckel diverticulum
2	4.7.61	M	Normal	Bilateral RCH; absent thumbs; 4 digits left hand	
3	6.7.62	F	Normal	Bilateral RCH with 4 digits both hands; Klippel Feil syndrome	
4	15.7.63	F	Normal	Bilateral RCH	
5	26.12.65 Died after surgical correction in 1968	M	Normal	Bilateral RCH with absent thumbs	Oesophageal hiatus hernia
6	15.3.68	F	Mother had fever and arthralgia in 2nd month of pregnancy; rubella titre: mother 1/64, baby 1/256	Rt. RCH, with anomalies of hand; absent ulna, lt. hand	
7	12.2.68 Died 19.3.68	F	Normal	Bilateral RCH with multiple rib anomalies	Duodenal atresia annular pancreas; horseshoe kidney
8	5.10.69 Died 9.10.69	M	Normal	Bilateral RCH with absent digits both hands	Lt. cystic kidney, Oesophageal atresia; bilateral inguinal herniae

ASD, atrial septal defect; VSD, ventricular septal defect; PFO, patent foramen ovale; TGA, transposition of great vessels; PDA, persistent ductus arteriosus.

FIG. 2.—Case 2, 10 months old, with bilateral radial clubbed hand; ventricular septal defect was present.

almost two-thirds had some other abnormalities: 21 had non-skeletal anomalies, mostly of the gastrointestinal tract, and 8 patients had congenital heart disease. This percentage of heart disease (8/61 = 13%) is much higher than that found in the normal

population (Keith, Rowe, and Vlad, 1967; Hoffman and Rudolph, 1965).

In the prenatal history of our patients, we could establish a relation between maternal health during pregnancy and the occurrence of the congenital

Hands (RCH) and Congenital Heart Disease

Clinical Findings of Cardiovascular System	Cardiac Catheterization and Angiographic Findings	Necropsy Findings
Cyanosed from birth, improved on oxygen; no heart murmur detected		Pulmonary valve and trunk atresia, dextro-posed aorta, VSD, PFO
Breathless at rest; pansystolic ejection murmur over praecordium; ECG biventricular hypertrophy	PDA—ligated lt.-rt. shunt at ventricular level; pulmonary hypertension	
Episodes of cardiac failure; haemoptysis; auscultatory findings of VSD with flow murmur at apex	Lt.-rt. shunt at atrial level; pulmonary artery pressure slightly raised	
Asymptomatic clinical findings of ASD	Lt.-rt. shunt at ventricular level; persistent lt. superior vena cava draining to coronary sinus; raised pressure in RV and pulmonary artery	Repaired VSD; haemorrhagic pancreatitis
No cyanosis or clubbing, RV + pansystolic murmur; + soft diastolic murmur; ECG, biventricular hypertrophy	PDA—ligated TGA; ASD; VSD (post-Rashkind septostomy)	
Failure to thrive; cyanotic attacks; huge heart		
Cardiac failure from 2nd day of life; loud pansystolic murmur; ECG, P pulmonale, RV hypertrophy	ASD; lt.-rt. shunt	ASD 0.5 cm diameter; high membranous VSD
Cyanosed from birth; gross cardiac failure		Membranous VSD; PDA

FIG. 3.—X-ray of the patient shown in Fig. 1; in the left arm there is absent radius and absent thumb.

TABLE II
*Associated Anomalies (38) in 61 Patients with Radial
Clubbed Hands*

Associated Defects	No.
Skeletal	22
Gastrointestinal tract	13
Cardiovascular system	8
Genitourinary tract	4
Central nervous system	1
Ears	1
Blood	1

defects in one patient only (arthralgia and fever during early pregnancy in the mother, and high rubella titre in the baby).

As to the role of drugs in the aetiology of RCH, in 9 patients thalidomide was the probable cause, as there was a clear history of the ingestion of this drug; no heart defect was found among these 9. Nevertheless, we cannot ignore the fact that half of the affected children with RCH, including 3 with congenital heart defects, were born during the period when most of the thalidomide babies were born.

Our series of patients with RCH varies from that of Harris and Osborne (1966) who stressed the association with a VSD anomaly: in our series the association was with a wider spectrum of congenital heart disease.

No familial incidence could be traced among these 8 cardiac patients and that finding correlates with Harris's series. Only in one patient with RCH was another member of the family similarly affected, and this is in contrast to the Holt-Oram syndrome (atrial septal defects associated with anomalies of the thumb) which is familial (Holmes,

1965; Holt and Oram, 1960; Massumi and Nutter, 1966; Zetterqvist, 1963).

Chromosomal aberrations were reported in the RCH syndrome (Faed, Stewart, and Keay, 1969). No chromosomal studies were performed in this series.

Upper limb anomalies are often associated with other systemic abnormalities (Feingold, 1967); in the case of RCH the incidence of coexisting heart disease is high, and the heart disease tends to be complicated and fatal.

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