

Electrocardiographic Case: Q Waves In ECG - A Clue To Diagnosis

S C Quek, K S Ng, W L Ng, L H Ling

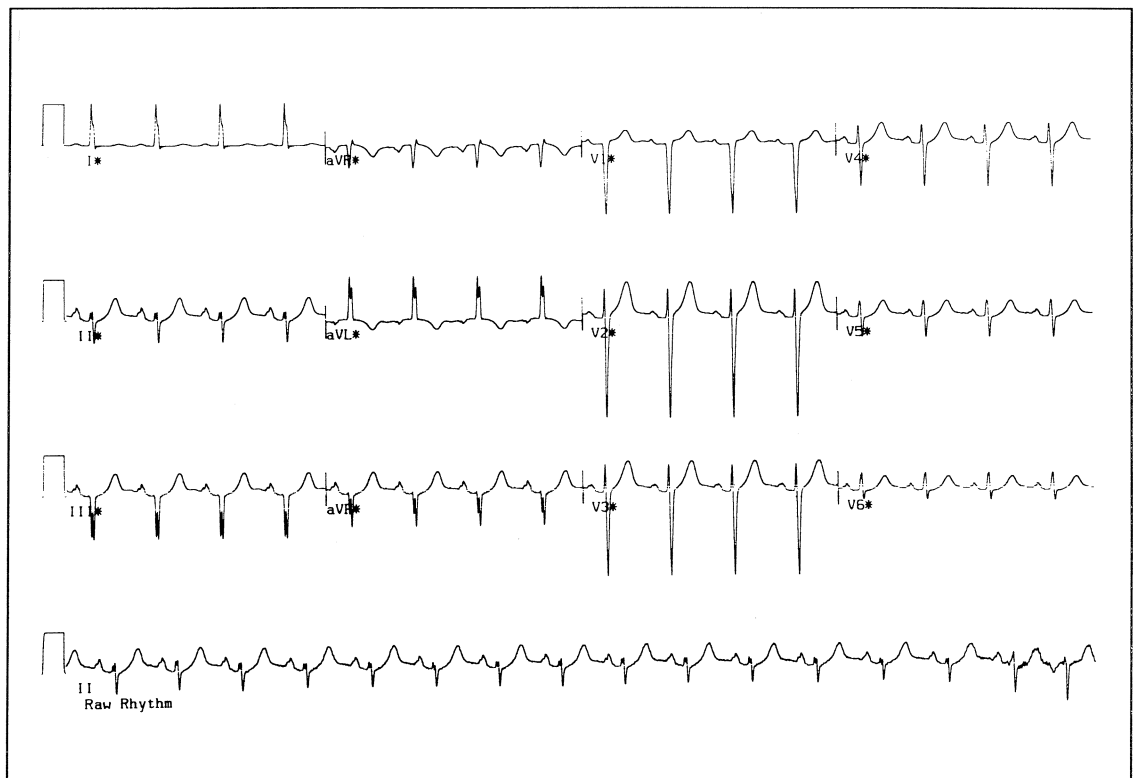


Fig 1

Department of Paediatrics
National University of Singapore
5 Lower Kent Ridge Road
Singapore 119074

S C Quek, M Med (Paed),
DCH (London), FAMS
Senior Lecturer

Cardiac Department
National University Hospital

K S Ng, MBBS, MRCP (UK),
FAMS
Consultant

W L Ng, MBBS, FRACP
Consultant

L H Ling, MBBS, MRCP (UK)
Consultant

Correspondence to:
Dr S C Quek

CASE HISTORY

A 33-year-old man had some non-specific chest discomfort and was seen by a general practitioner. His exercise tolerance remained good. Physical examination was unremarkable except for a soft ejection systolic murmur that was probably functional. He was referred for an opinion following a 12-lead electrocardiogram (Fig 1) which appeared unusual. What is your diagnosis?

ANSWER

Diagnosis: Corrected transposition of great arteries

DISCUSSION

The 12-lead ECG demonstrates sinus rhythm with a left-axis deviation. The interesting features are Q wave in V1 and an absence of Q waves in the left precordial leads. There is no evidence of heart block or pre-excitation.

This patient underwent an echocardiographic examination which confirmed a diagnosis of corrected transposition of the great arteries (c-TGA). In this condition, there is ventricular inversion. Venous blood is returned to the right atrium and passes through a bileaflet mitral valve into a morphologic left ventricle. The blood is then pumped into the rightward posterior pulmonary artery for oxygenation. Pulmonary venous blood drains through the trileaflet (tricuspid) valve into a morphologic right but left-sided ventricle. Oxygenated blood is then distributed to the body via the leftward anterior aorta.

With the orientation in a normal heart, electrical activation of the ventricles begins in the ventricular septum and is directed left to right in a slightly anterior direction. This results in the normal pattern of Q waves in the precordial leads with a qR pattern in V6 and a Rs in V1. In c-TGA, the interventricular septum is more sagittal and oriented left posterior to right anterior. With ventricular inversion, both its surfaces and ventricular bundle branches are inverted and initial activation is now right to left. This accounts for a reversal of the normal Q wave pattern such that Q waves are now present in the right precordial leads but absent in the left⁽¹⁻³⁾. However, this pattern may be confounded by associated lesions producing pressure or volume overload.

A frequent complication of c-TGA is the development of various degrees of heart block. Spontaneous complete heart block has been quoted

at a rate of about 2% per year⁽⁴⁾. Other associated anomalies, which were not found in our patient, have also been described. These include ventricular septal defect and subvalvular pulmonary stenosis and atrioventricular valve abnormalities.

Whether or not the morphologic right ventricle can function effectively as the systemic ventricle in the long-term has been brought to question. While Peterson *et al*'s work⁽⁵⁾ suggests an abnormal exercise response, others^(7,8) have supported preservation of right ventricular integrity for many years.

No treatment is necessary for our patient at this stage. Nevertheless, he needs to be followed up for any possible complication in the future.

REFERENCES

1. Shem-Tov A, Deutsch V, Yahini JH, Kraus Y, Neufeld HN. Corrected transposition of the great arteries: a modified approach to the clinical diagnosis in 30 cases. *Am J Cardiol* 1971; 27:99-113.
2. Fernandez F, Laurichesse J, Siebat L, Lenegre J. Electrocardiogram in corrected transposition of the great vessels of the bulboventricular inversion type. *Br Heart J* 1970; 32: 165-71.
3. Okamura K, Takao A, Hashimoto A, Hosoda S, Mimori K. Electrocardiogram in corrected transposition of the great arteries with and without associated cardiac anomalies. *J Electrocardiology* 1973; 6:3-10.
4. Emmanouilides G, Allen HD, Riemenschneider TA, Gutgesell HP. *Moss and Adams' Heart Disease in infants, children, and adolescents*. Baltimore: Williams and Wilkins 1995: 1240.
5. Peterson RJ, Franch RH, Fajman WA, Jones RH. Comparison of cardiac function in surgically corrected and congenitally corrected transposition of the great arteries. *J Thorac Cardiovasc Surg* 1988; 96:227-36.
6. Ikeda U, Furuse M, Suzuki O, Kimura K, Sekiguchi H, Shimada K. Long term survival in aged patients with corrected transposition of the great arteries. *Chest* 1992; 101:1382-5.
7. Benson LN, Burns R, Schwaiger M, et al. Radionuclide angiographic evaluation of ventricular function in isolated congenitally corrected transposition of the great arteries. *Am J Cardiol* 1986; 58:319-24.
8. Dimas AP, Moodie DS, Sterba R, Gill CC. Long term function of the morphologic right ventricle in adult patients with corrected transposition of the great arteries. *Am Heart J* 1989; 118:526-30.