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Coronary Artery Anatomy in Corrected Transposition of the Great Arteries

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Congenitally corrected transposition of the great arteries is an unusual cardiac malformation with discordant atrioventricular and ventriculoarterial alignments. Because knowledge of the coronary artery anatomy is a prerequisite for successful repair of this cardiac anomaly, selective coronary arteriography was performed in 13 children (4 male and 9 female; age range 18 months to 16 years) and 1 adult (aged 59 years) with congenitally corrected transposition of the great arteries and associated intracardiac defects.

The typical coronary distribution of corrected transposition (that is, coronary artery-ventricular concordance) was found in 11 patients. In one patient, a single coronary ostium was observed; the right sinus of Valsalva gave rise to a short common branch that divided into three arteries: a left circumflex artery going to the right, a well developed left anterior descending artery running into the anterior interventricular groove and a third vessel that continued on the normal course of the right coronary artery directed posteriorly. In one patient, the left circumflex artery was particularly small. In another patient, with severe hypoplasia of the left anterior descending coronary artery, the anterior ventricular wall of the heart was supplied by three small branches that ended a short distance from their origins. The adult patient had a large anterior ventricular branch arising from the morphologic left coronary artery as well as a large acute marginal branch, with a wide distribution, from the morphologic right coronary artery.

Presurgical coronary angiographic documentation is helpful because, in congenitally corrected transposition as well as in complex congenital heart disease, coronary anomalies (in origin, course and distribution) are occasionally present and knowledge of their presence can help determine the most appropriate surgical approach.

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Congenitally corrected transposition of the great arteries is an unusual cardiac malformation with atrioventricular (AV) discordance and ventriculoarterial concordance. The morphologic right atrium receives the systemic venous return and drains it into the morphologic left ventricle through the mitral valve. The morphologic left atrium receives the pulmonary venous return and is connected with the morphologic right ventricle by the tricuspid valve. The great arteries placed across the septum originate from the morphologically inappropriate ventricles. Thus, the anatomic right ventricle functions as a systemic pumping chamber, and the anatomic left ventricle as a pulmonary ventricle.

Congenitally corrected transposition of the great arteries rarely occurs in the absence of associated intracardiac anomalies (1–5) (1% of patients [6]). Although a physiologic correction of the course of the blood flow occurs in such patients, anatomic abnormalities may cause cardiac disability (6–9). Therefore, even though survival to adulthood is likely, life span is reduced and survival after the age of 50 years is uncommon (6–14). Unfortunately, congenitally corrected trasposition is generally associated with one or more intracardiac defects, namely, ventricular septal defect, pulmonary valve or subpulmonary stenosis, atrial septal defect and abnormalities of the systemic atrioventricular (AV) valve with moderate to severe regurgitation; those defects can cause severe hemodynamic derangement and be responsible for an early death (15–21).

These anomalies are susceptible to surgical repair mainly because of the physiologic course of the blood (19,22–30). However, the unusual disposition of the conducting tissue within the heart creates technical difficulties during surgical repair, increases the risk of death and reduces the probability of successful correction (19,23,25,26,29–33). Furthermore, the coronary artery pattern in corrected transposition

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