Reversal of Fortune:
TRANPOSITION SURGERY
IN THE PRE-SWITCH ERA

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Financial Disclosure

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THE
MORBID ANATOMY
OF
SOME OF THE MOST IMPORTANT
PARTS
OF THE
HUMAN BODY.

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 Luo Nov.
1803.
“It is evident from the structure of this heart... that a dark coloured blood must have been circulating between the right ventricle and the general mass of the body, except for the small quantity of florid blood... through the ductus arteriosus.”

— Matthew Baillie, 1799
William Mustard
C. Walton Lillehei
40. The Surgical Management of Transposition of the Great Vessels


Mortality from this condition is extremely high in the first few months of life. Total correction under six months will probably remain a surgical feat with a high mortality. A palliative procedure in the neonatal period which would allow subsequent total correction appears to us to be a satisfactory goal. Our results, and those of others, of creating an atrial septal defect in the first few months are encouraging; 75% of these infants can be improved. The second stage, total correction, should be performed before the child deteriorates or develops irreversible pulmonary vascular changes. The operation should be as simple as possible and allow for growth of the heart. Preliminary studies in the laboratory demonstrated that autogenous pericardium will grow when sutured into the atrial wall in piglets. An operation was devised in which a pericardial baffle transposed pulmonary venous return to the right ventricle and systemic venous return to the left ventricle. This procedure has been clinically successful and will be described in detail.
“[Senning’s operation is a] complicated procedure... [that] although ingenious, is technically extremely difficult in the infant or small child.”

— William Mustard, 1966

William Mustard
Anatomic correction of transposition of the great vessels

We present a new approach for anatomic correction of transposition of the great arteries. The two coronary arteries, with a piece of the aortic wall attached, are transposed to the posterior artery. The two aortic openings are closed with a patch. The aorta and pulmonary artery are transected, contraposed, and then anastomosed. The interventricular septal defect is closed with a patch, through a right ventriculotomy approach, because the right ventricle is no longer part of the systemic circulation. Two patients, aged 3 months and 40 days and weighing 4,200 and 3,700 grams, respectively, were operated upon with deep hypothermia and total circulatory arrest. There was good recovery from the operation, with normal cardiocirculatory conditions. Renal failure developed in the first patient, and she died on the third postoperative day. During this time the cardiocirculatory conditions were good. The second patient made an uneventful recovery. Hemodynamic studies 20 days after the operation showed complete correction of the malformation. Five and one-half months after the operation, he weighs 7,500 grams, and his development is very good. We believe that this operation will be reproducible by most cardiovascular surgeons and will be an alternative to the Mustard procedure, especially for those patients with interventricular septal defect and pulmonary hypertension.

São Paulo, Brazil
Sponsored by E. J. Zerbini, M.D., São Paulo, Brazil

The ideal operation for transposition of the great vessels must be one performed at the arterial level. To divide, contrapose, and then reanastomose the great arteries is not a surgical problem. The major technical difficulty in this approach has been the transfer of the coronary arteries. The earliest attempts made more than twenty years ago were uniformly unsuccessful.¹ ⁵ Reanastomosis at the arterial level, however, is technically feasible.

Surgical procedure

The patients are operated upon with the use of profound hypothermia (16° C.) and total cardiocirculatory arrest according to the technique described by Mori,¹⁰ Barratt-Boytes,¹¹ and their colleagues.

The heart is exposed by means of a median sternotomy. The pericardium is opened wide by an incision beginning at the suprasternal notch and extending to the base of the heart.

The pericardial cavity is filled with cold crystalloid solution and the heart is flushed with cold saline. This is followed by a period of total circulatory arrest during which the heart is perfused with cold oxygenated crystalloid solution. The aorta and pulmonary arteries are transected above the coronary ostia. The coronary ostia are carefully identified and dissected free from the aorta and pulmonary arteries. The coronary arteries are then divided at the base of the heart and their proximal ends are sutured to the posterior aortic wall. The aortic end is then sutured to the pulmonary artery and the pulmonary arterial end to the aortic isthmus. The ventricles are then opened through a right ventriculotomy and the interventricular septal defect is closed with a patch. The cardiopulmonary bypass is then resumed and the patient is weaned from the support apparatus.