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Right ventricular remodeling in congenital heart disease using biological prosthesis and new lines of research

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Background: The reconstruction of the right ventricular outflow tract (RVOT) in congenital heart disease has attracted the interest of cardiac surgeons determined to alleviate the anatomic obstruction and restore RV function.

Methods: From June 1991 to July 2012, 203 consecutive patients (mean, 3.0 years; range, 2 months to 35 years) underwent operations. These patients were classified into 5 groups: group 1, tetralogy of Fallot with pulmonary hypoplasia (144 cases, 70.9%); group 2, pulmonary atresia (PA) with ventricular septal defect (VSD) (32 cases, 15.7%); group 3, truncus arteriosus (12 cases, 5.9%); group 4, transposition of the great arteries with left ventricular outflow tract obstructions (8 cases, 3.9%); and group 5, PA with intact ventricular septum (7 cases, 3.4%). Remodeling surgery of the RV consisted of patch closure of the VSD (n = 176), tricuspid valvuloplasty repair (n = 25), infundibulum muscle resection, and reconstruction of the RVOT (all patients). The Lecompte procedure was performed in 8 patients in group 4, and the one and a half ventricle technique was performed in 7 patients in group 5.

Results: There were 21 hospital deaths (10.3%); 180 patients (88.6%) survived. Patients were followed up from 4 to 240 months (mean, 98.0 months). Sixteen patients (8.8%) underwent reoperation for prosthesis dysfunction, with 2 hospital deaths (12.5%). The rest of the patients (164, 80.7%) remain free of reoperation.

Discussion: The cardiac prostheses available on the market today: mechanical or biological, are durable and functional, but are still not the ideal valve replacement. In search of material biocompatible, resistant to fatigue, low rate of calcification, thromboembolism and infection, the poly carbonate urethane (PCU) material, as a viable alternative

Conclusion: Earlier reconstruction of the pulmonary valve and the RVOT may preserve ventricular performance for a long period. Nevertheless, the porcine pulmonary prosthesis has shown satisfactory results when it has been used for the reconstruction of different types of RV obstructions, but the calcification after 8 to 10 years is inevitable.

Published experimental work demonstrated good hemodynamic performance of prosthetic PCU implanted on the right side of the heart: free of gradients, calcification, rupture, thrombosis and infection, after 1 year of implantation.

Biography

Graduated in Medicine-Córdoba National University, Argentina (1972) Residency in General Surgery-Cordoba Hospital, Argentina, (1973-1974). Thoracic Surgery Residency-Córdoba Hospital, Argentina (1974-1976). Specialization Course in Cardiovascular Surgery-University of São Paulo-Brazil (1977-1985), as Assistant Professor. E. J. Zerbini. Specialist in Cardiovascular Surgery at the Brazilian Society of Cardiovascular Surgery (1982); Masters (1986-1987), Ph.D. (1988-1991) and Full Professor (1988) at São Paulo Federal University. Visiting Professor to the service of Prof. De Leval, at Great Ormond Street Hospital, London (1987), sharing the experience with technique of cavopulmonary shunt (bidirectional Glenn and tunnel VCI-APD), instead of atriopulmonary (Fontan operation), for the treatment of univentricular heart; Introducing this technique at UNIFESP, since 1990, being the first center in Brazil using routine technique Bidirectional Glenn and Tunnel VCI-APD; subsequently adopted by the Pediatric Heart Surgery services by all over the world, with significant reduction in mortality. Right Ventricle remodeling technique using four own models of porcine pulmonary prosthesis for surgical correction of Congenital Heart Disease with obstruction of the pulmonary outlet tract. Implementation of the modified technique of ultrafiltration after CPB and in Pediatric Intensive Care Unit, developed by Prof.. M. Elliott, at Great Ormond Street Hospital, London (1995)

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