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Commentary

Commentary: Treatment for Truncus Arteriosus Needs to Be Tailored

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Recent improvements in cardiopulmonary bypass (CPB), surgical techniques, prenatal diagnosis, and perioperative management have reduced mortality for truncus arteriosus, which has an early mortality rate of 3% to 20% and long-term survival of approximately 75% at 20 years [1]. In the current era, early single-staged surgical correction of the truncal defect and its associated pathologies is recommended [2]. As survival for patients with truncus arteriosus continues to improve, the importance of tailored management, such as adequate repair with meticulous surgery and vigilant perioperative monitoring, cannot be overemphasized for successful outcomes, particularly in high-risk patients such as those with prematurity, genetic anomalies, extracardiac problems, very low weight, preoperative shock, truncal valve dysfunction, and arch anomaly. Morbidity for patients with truncus arteriosus occurs in the form of right ventricle (RV) to pulmonary artery (PA) or truncal valve reinterventions [1,2]. Management strategies aim at minimizing the frequency and invasiveness of reintervention, thereby optimizing functional performance and overall quality of life and improving long-term survival.

Truncal valve dysfunction is the most important factor in determining the prognosis because of its association with a poor preoperative condition and residual truncal valve regurgitation. Truncal valve regurgitation causes detrimental side effects of volume loading and diastolic runoff in diastolic ventricular dysfunction. In the present study [3], truncal valve dysfunction was a risk factor for overall mortality and truncal valve reintervention. As adequate truncal valve intervention improves survival, timely and advanced tailored techniques are required for truncal valve repair before left ventricular dysfunction occurs [4]. Truncal valve repair also frequently requires truncal valve reintervention. The risk for reoperation on the truncal valve is related to the presence of significant truncal valve insufficiency, truncal valve morphology, and truncal valve intervention at the initial operation [2]. A shorter interval until reoperation for the truncal valve is also a risk for recurrent reoperation [2]. It is very important for the initial repair to be as durable as possible, and optimizing truncal valve function can reduce the number of repeated interventions. It is necessary to lower the threshold to perform timely truncal valve replacement for significant truncal valve regurgitation if truncal valve repair is difficult.

A longer CPB time means intraoperative complications, revisions, or residual lesions because of anatomical complexities and difficulty in repair, and is a risk factor for overall mortality [3,5]. However, the duration of CPB is also related to performing more precise repair, additional revisions for minimal residual lesions, and complete myocardial resuscitation. Optimal repair, rather than CPB duration in itself, is a more important factor for avoiding adverse events. Currently, the best surgical results can be achieved despite long CPB durations, because more adequate repairs with improved perfusion strategies and me-

ticulous perioperative care have all reduced the impact of prolonged CPB on worse outcomes.

In the present study [3], freedom from RV-PA reintervention at 3 years for initial RV-PA connection was found in 75.0% of patients treated with homografts, 66.7% of those who underwent direct connection (*réparation à l'étage ventriculaire* [REV] procedure), 46.7% of those who received a valveless polytetrafluoroethylene (PTFE) conduit, 40.0% of those who received a valved PTFE conduit, and 20.0% of those treated with a Contegra conduit. Although freedom from RV-PA reintervention was not significantly different according to the type of conduit, homograft, REV, and valveless conduits tended to be more durable, whereas valved nonhomograft conduits tended to be less durable. Smaller RV-PA conduit placement at the initial repair increased the risk of conduit reintervention [2,6]. However, larger RV-PA conduits are also associated with distortion of the pulmonary arteries or truncal valve, sternal or coronary compression, and larger ventriculotomy [1, 5]. As a shorter duration to reintervention for RV-PA conduits was a risk for recurrent intervention, it is very important to perform the initial repair using the most durable type and size of conduit [2]. RV function and cardiopulmonary exercise tests during long-term follow-up need to be compared to achieve better results according to the type and size of conduit. Complex anatomy, such as arch obstruction and a number of truncal valve cusps other than 3, was a risk factor for RV-PA reintervention [3]. An unfavorable course from the RV to PA and a tight space at the distal end of the RV-PA conduit, which are more likely to be present in complex anatomy, might be related to earlier reintervention, and a tailored approach with an optimal conduit type and size is critical, particularly in patients with complex anatomy.

The Kaplan-Meier method only assesses the first reintervention after complete repair, and cannot comprehensively assess all reinterventions of a patient experiencing several similar events sequentially [3]. However, modulated renewal is an optimized analysis for multiple reinterventions that assesses the risk of subsequent reoperation from the most recent reoperation, rather than from complete repair [2]. This analytical method can identify factors during each interval that improve the durability of each intervention. A shorter duration to reintervention, for either the truncal valve or RV-PA conduit, was identified as a risk for recurrent intervention, and it is very important to make the most durable repair possible [2].

The surgical results of truncus arteriosus have consistently improved because numerous long-term studies have analyzed the outcomes of truncus arteriosus repair. However, there is still substantial room for improvement in this challenging disease. Future studies need to be improved by data segmentation and important details to identify factors associated with better long-term outcomes, and a systematically developed, prospective multi-institutional database is necessary to establish optimally tailored treatment strategies.

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