future more appropriate targeted screening of some kind should occur.

We commend Batteux and colleagues[1] for their important contribution in developing more objective follow up protocols after ASO.

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Commentary: Coronary origins after the arterial switch operation: Let's think of it like anomalous aortic origin of the coronaries

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Translocated coronaries after the arterial switch are vulnerable as in patients with AAOCA.

CENTRAL MESSAGE

The translocated coronary ostia and main coronary arteries after the arterial switch operation should be thought of as we do in patients with anomalous aortic origin of a coronary artery.

We have gotten really good at moving coronary ostia. The hallmark of a successful arterial switch operation (ASO) is accurate translocation of the coronary ostia, no matter how they originate, to what becomes the aortic root ("neo-aortic root"). Congenital heart surgeons have developed many effective techniques to perform the ASO in essentially every coronary branching pattern and ostial orientation. Furthermore, we have ways to deal with an intramural course of a main coronary artery, a single coronary ostium, and all varieties of great vessel orientation. Thus, expectations for survival after the ASO are very high, and they should be. As we have reported recently, in a series of 394 patients (including transposition of the great arteries with intact ventricular septum, transposition of the great arteries with ventricular septal defect with/without aortic arch hypoplasia, and the Taussig–Bing anomaly [double-outlet right ventricle with subpulmonary ventricular septal defect]), we had no in-hospital deaths and 1 out-of-hospital death over the last 23 years.[1] Others have achieved similar results.

Short- and intermediate-term outcomes, however, do not tell the whole story. Information continues to accrue concerning the fate of translocated coronary ostia and coronary arteries after the ASO. Some ostia and proximal coronaries do occlude or become stenotic. Thus, we are left with

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a long-term management dilemma. What should we do with these patients? How should we follow them and how long? Should they all undergo periodic imaging beyond echocardiography? Computed tomography? Magnetic resonance imaging? Periodic cardiac catheterization with coronary angiography? How do we interpret the information? Current guidelines are vague and objective, longitudinal data are limited.[2]

I have long believed that the great vessel arrangement and the location and course of the translocated coronary arteries after the ASO amount to what is essentially surgically created anomalous aortic origin of the coronaries (AAOCA). As is well-published in this and many other peer-reviewed journals, congenital AAOCA has garnered much attention in recent years. AAOCA is the second-leading cause of sudden cardiac death in young people. Although clinical symptoms are relatively rare in AAOCA, anomalous origin of either the right or left coronary artery from the wrong sinus, or with pericommissural or intramural course, has been associated with sudden cardiac death. Several AAOCA registries have been created, symposia developed to discuss current evidence, and guidelines based on best-available evidence generated.[3] AAOCA has become a very important area of study. There are several variants of AAOCA that have been implicated in an increased risk of sudden cardiac death, including anomalous origin of the left coronary from the right aortic sinus and a juxta-aortic course.

I submit that the same level of attention and coordination of effort should be developed for patients after the ASO. In fact, I have suggested that patients undergoing the ASO should be included, as a subset, in the AAOCA registries. The translocated coronaries after the ASO cannot be entirely normal. In many (most) patients after the ASO, one or both of the coronaries come to lie between the great vessels. The course of a main coronary artery may be very tangential to the neo-aorta, eg, the angle of origin of the proximal coronary may be very abnormal. As such, I believe our colleagues from Hopital Necker Enfant Malades in Paris, who have an enormous experience with the ASO, have made an important contribution to the longitudinal surveillance of patients after the ASO. As is elegantly described in their article in this issue of the *Journal*, the team from Paris carried out detailed geometric analyses of the ostial orientation and proximal main coronary course using computed tomography angiography.[4] Their analysis appears to have identified a subset of patients at greater risk of late coronary events. The objective measurements of coronary and ostial geometry are compelling and provide a framework for objective data collection on patients after the ASO beyond current measures. Just as is occurring in the study of AAOCA, these measures serve to help us risk stratify our patients after the ASO.

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