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Commentary: The arterial switch operation: Is it still all about the coronaries?

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Ever since the first successful arterial switch operation (ASO) by Jatene in 1975,¹ it has been recognized that coronary artery transfer is the most critical step of this procedure.² Advances in surgical techniques, such as the use of generous trapdoor incisions to minimize axial rotation of the coronary buttons during translocation (Figure 1), have improved surgical results and allowed the successful transfer of all coronary patterns.³ However, despite the recognition that all patterns are “switchable,” there are unquestionably some that are technically more challenging to translocate than others. Do these technical challenges translate into differences in outcomes?

Large studies from the 1980s and 1990s described a greater mortality for patients with single and intramural coronaries.^{4,5} Despite some recent studies still showing a greater mortality in patients with a single coronary,⁶ others

Trapdoor incision technique for coronary artery translocation.

CENTRAL MESSAGE

Despite improvements in outcomes with the arterial switch operation, patients with coronary abnormalities continue to be a challenge. The long-term effects of coronary translocation are still unclear.

have concluded that coronary abnormalities are no longer a risk factor for mortality,⁷ presumably due to increased surgical experience.

In this issue of the *Journal*, Fricke and colleagues⁸ report an impressive series of 1033 patients who underwent ASO between 1983 and 2013 in 2 centers in Australia with a median follow-up of 14 years. The authors should be commended for their effort. In the study, the trapdoor technique was used for all patients. Early mortality was 3% for patients with usual coronary arrangement and 3.9% for those with any abnormal coronary anatomy. Despite this relatively similar mortality rate, the subset of patients that had all coronaries arising from the same sinus had an early mortality of

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FIGURE 1. The creation of generous trapdoor incisions for coronary translocation in the arterial switch operation maintains the same angulation of the coronary arteries, minimizing axial rotation (*bottom left panel*). Other techniques may change the angle of the coronary arteries, possibly causing torsion of the vessels (*bottom right panel*). ©2013 Texas Children's Hospital (reprinted with permission).

6.4%, a difference that did not reach statistical significance, likely due to the relatively low number of events. Interestingly, early mortality for patients with intramural coronary arteries was only 1.9%.

Despite the lack of a significant difference in survival, the use of postoperative mechanical support was significantly different between patients with usual coronary anatomy (2.9%) and those with either abnormal coronary origin (6.5%) or intramural coronaries (9.6%).⁸ This finding suggests that despite these patients continuing to be high risk, an improved ability to salvage those patients may be partly responsible for the improvement in outcomes.

As we mitigate the effect that abnormal coronary anatomy has on early survival, it behooves us to focus on the long-term implications of coronary anatomy on ASO survivors. The study by Fricke and colleagues,⁸ like the vast majority of other studies, does not provide long-term imaging of the coronary arteries. It is becoming clear that translocated coronaries do not behave like normal coronaries in the long term. In a recent study of 50 asymptomatic patients who underwent computed tomography angiography 14 to 25 years after ASO, 30 (60%) patients had coronary abnormalities such as ostial stenosis, acute branching of a vessel, muscular bridge, kinking, etc.⁹ In another study of 40 patients, mostly asymptomatic, 11% had late coronary artery stenosis.¹⁰ The effect that an abnormal coronary pattern has on the long-term occurrence of these abnormalities is unknown. What is clear is that despite all we have done to

mitigate the risk, coronaries continue to be front and center when we talk about the ASO.

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