complete the picture and define risks and benefits more precisely.

Goldsmith and colleagues are clearly building the case for early diagnostic coronary angiography in patients with suspicion for myocardial ischemia after congenital cardiac surgery. Despite the poor outcome of coronary artery obstruction, it is encouraging that the majority of lesions were anatomic and amenable to intervention. Similar to the proven benefit of early intervention in adults with myocardial infarction,⁴ it is time to strengthen the old paradigm of “time is muscle” in pediatric patients as well.

References

1. Goldsmith MP, Allan CK, Callahan R, Kaza AK, Mah DY, Salvin JW, et al. Acute coronary artery obstruction following surgical repair of congenital heart disease. *J Thorac Cardiovasc Surg.* 2020;159:1957-65.e1.
2. Vranicar M, Hirsch R, Canter CE, Balzer DT. Selective coronary angiography in pediatric patients. *Pediatr Cardiol.* 2000;21:285-8.
3. Kato A, Lo Rito M, Lee KJ, Haller C, Guerguerian AM, Sivarajan VB, et al. Impacts of early cardiac catheterization for children with congenital heart disease supported by extracorporeal membrane oxygenation. *Catheter Cardiovasc Interv.* 2017;89:898-905.
4. Park J, Choi KH, Lee JM, Kim HK, Hwang D, Rhee TM, et al. Prognostic implications of door-to-balloon time and onset-to-door time on mortality in patients with ST-segment-elevation myocardial infarction treated with primary percutaneous coronary intervention. *J Am Heart Assoc.* 2019;8:e012188.

See Article page 1957.

Commentary: Survival after coronary injury—it's about time

Ibrahim Abdullah, MD, and Zohair Al-Halees, MD

In this issue of the *Journal*, Porras and colleagues¹ present the largest retrospective series of this era from a single institution analyzing acute coronary artery obstruction (CAO) following congenital heart disease surgery. It is noteworthy that out of 13,370 patients with congenital heart disease (CHD) who underwent open heart surgery requiring cardiopulmonary bypass (CPB), only 37 were found to have acute postoperative CAO. Out of these, 34 were analyzed. Although this represents a very small number from such a large population, the consequences of acute postoperative CAO remain devastating, with 79% of the patients requiring extracorporeal membrane oxygenation (ECMO) support at the time of cardiac catheterization, 59% experiencing a composite outcome of mortality or listing for transplantation, and a 41% mortality rate at discharge. Despite these humbling statistics associated with acute postoperative CAO, the authors validate the importance of early recognition and intervention.

Ibrahim Abdullah, MD

CENTRAL MESSAGE

Survival after postoperative coronary artery obstruction for congenital heart disease is dependent on timely recognition and intervention.

In their analysis, patients who experienced the foregoing composite outcome had significantly longer (more than double to almost triple) sentinel event to catheterization times, as well as significantly longer times from sentinel event to intervention. Furthermore, it is interesting to note that in their review, 65% of the operative notes raised no coronary concerns. Perhaps this is why a sentinel event, as defined by the authors, served as the starting point from which to measure the time to catheterization and intervention.

Our experience with acute postoperative CAO at the King Faisal Specialist Hospital and Research Center anecdotally mirrors the experience of the authors. The vast majority of such complications, although infrequent, have been associated with operations in which there has been direct technical

From the Department of Pediatric Cardiac Surgery, King Faisal Specialist Hospital & Research Center, Riyadh, Saudi Arabia.

Disclosures: Authors have nothing to disclose with regard to commercial support. Received for publication Nov 1, 2019; revisions received Nov 1, 2019; accepted for publication Nov 1, 2019; available ahead of print Jan 22, 2020.

Address for reprints: Ibrahim Abdullah, MD, Department of Pediatric Cardiac Surgery, King Faisal Specialist Hospital & Research Center, Riyadh, Saudi Arabia (E-mail: iabduallah1234@gmail.com).

J Thorac Cardiovasc Surg 2020;159:1969-70
0022-5223/\$36.00

Copyright © 2019 by The American Association for Thoracic Surgery
<https://doi.org/10.1016/j.jtcvs.2019.11.027>

manipulation of the coronary arteries, such as the arterial switch operation, or technical performance near a coronary artery, such as pediatric mitral valve replacement. In our experience with pediatric mitral valve replacement, we have found that although there may be a desire to place as large of a prosthesis as possible so as to minimize the number of future operations, a high mitral valve prosthesis-to-mitral valve annulus ratio negatively affects survival.^{2,3} This is thought to be related to circumflex compression, as the authors also noted in their angiograms. Other situations in which we have seen coronary complications include procedures for an anomalous left coronary artery from the pulmonary artery and repair of supraaortic stenosis due to distortion of the left coronary on sinus patch expansion.

Perhaps the most valuable insight for triggering an investigation and turning around the complication of an acute postoperative CAO is the clinical concern of the surgical

team, as we are uniquely aware of the technical conduct of the operation. This, coupled with a sentinel event as defined by the authors, should lower our threshold to investigate. With the availability of ECMO, intraoperative deaths are now very rare, giving the operative team time to investigate causes of myocardial failure and hemodynamic instability. However, as the authors show, with 79% of such patients requiring ECMO, the time to investigation and intervention is still critical.

References

1. Goldsmith MP, Allan CK, Callahan R, Kaza AK, Mah DY, Salvin JW, et al. Acute coronary artery obstruction following surgical repair of congenital heart disease. *J Thorac Cardiovasc Surg*. 2020;159:1957-65.e1.
2. Alsoufi B, Manlhiot C, Al-Ahmadi M, McCrindle BW, Kallooghlian A, Siblini G, et al. Outcomes and associated risk factors for mitral valve replacement in children. *Eur J Cardiothorac Surg*. 2011;40:543-51.
3. Assaqqat MA, Hassan W, Siblini G. Coronary arterial compression treated by stenting after replacement of the mitral valve in a child. *Cardiol Young*. 2003;13:475-8.