See Article page 237.

Commentary: Postoperative pericardial effusion: Surrounded by a conundrum

Mahmut Ozturk, MD,[a] Manan Desai, MD,[b] Aybala Tongut, MD,[a] and Can Yerebakan, MD, PhD[a]

Mahmut Ozturk, MD, Manan Desai, MD, Aybala Tongut, MD, and Can Yerebakan, MD, PhD

CENTRAL MESSAGE

Strategies to minimize blood transfusion and inflammation could contribute to lower postoperative pericardial effusion and morbidity rates after congenital heart surgery.

Pericardial effusion (PE) after congenital cardiac surgery is a significant complication that increases the duration of hospitalization, readmission, and reintervention.[1] There is a dearth of literature focused exclusively on the risk factors of this metric of postoperative morbidity in children.[1-3] As we continue to improve on the outcomes of congenital cardiac surgery it is prudent to study this unwanted complication in more detail in the current era.

In this issue of the *Journal*, Noma and colleagues[2] report on their analysis of the Japan Congenital Cardiovascular Surgery Database to assess the incidence and predictive factors of readmission or the need for drainage of PE after congenital heart surgery. We congratulate the authors for their in-depth analysis of the database that has added to our understanding of this postoperative complication. They analyzed data of 64,777 patients with significant postoperative PE, which was defined as one that requires drainage or readmission within 30 days. They reported an incidence of 1.4% for significant PE, which is at the lower end of the reported range in the literature (1%-23%). Univariable analysis of the patients with versus without PE revealed no significant difference for these groups according to age at surgery, sex, preterm delivery, and use of preoperative mechanical ventilatory support. Variables that were more common in the PE group were: the incidence of first-time cardiac surgery, pulmonary artery banding, duration of cardiopulmonary bypass, duration of aortic cross-clamp, blood transfusion, and 30-day mortality. There were 4 independent risk factors for postoperative PE, according to the multivariable analysis in this study: (1) trisomy 21, (2) 22q.11 deletion, (3) first-time cardiac surgery, and (4) blood transfusion.

Of the 4 predictive factors, only blood transfusion seems to be a relatively modifiable risk factor. This finding emphasizes the importance of aiming for cardiopulmonary bypass strategies with less use of blood products.[4] Trisomy 21 has also been shown by other studies to be a risk factor for PE.[3] This can be attributed to the higher prevalence of hypothyroidism and right-sided lesions in this subgroup.[5] Although a particular congenital anomaly has not been shown as a significant predictor of PE in this study, repair of an atrial septal defect has been associated with higher rates of PE.[3] The preemptive use of the pleuropericardial window is a routine practice in some centers. Unfortunately, studies on the basis of large databases lack granularity to investigate surgical details and compare their effects on outcomes. It is noteworthy that posterior pleuropericardial window has been shown to be beneficial in reducing pericardial tamponade and arrhythmias in adult cardiac surgery patients.[6]

The question of which patients would develop significant postoperative PE is largely unpredictable. Fast-tracking of congenital cardiac operations assigned for lower The

From the [a]Division of Cardiac Surgery, Children's National Hospital, George Washington University School of Medicine and Health Sciences, Washington, DC; and [b]Department of Cardiothoracic Surgery, Lucile Packard Children's Hospital, Stanford University, Palo Alto, Calif.

Disclosures: The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Feb 13, 2022; revisions received Feb 13, 2022; accepted for publication Feb 17, 2022; available ahead of print March 5, 2022.

Address for reprints: Can Yerebakan, MD, PhD, Division of Cardiac Surgery, Children's National Hospital, George Washington University School of Medicine and Health Sciences, Washington, DC 20010 (E-mail: cyerebakan@childrensnational.org).

JTCVS Open 2022;9:244-5

2666-2736

https://doi.org/10.1016/j.xjon.2022.02.016

Society of Thoracic Surgeons-European Association for Cardio-Thoracic Surgery (STAT) scores has been reported to be safe and economically beneficial.[7] It is unlikely that programs would allow a prolonged chest tube presence in a certain subgroup of patients over others in anticipation of possible PE. Alternatively, the focus needs to be directed on strategies to minimize postoperative inflammation after congential heart surgery and cardiopulmonary bypass. It would be interesting to know whether novel strategies such as the additional use of inhaled nitric oxide to the cardiopulmonary bypass circuit, which has been shown to reduce inflammation and postoperative morbidity, might affect the occurrence of significant PE.[8]

References

1. Kogon B, Jain A, Oster M, Woodall K, Kanter K, Kirshbom P. Risk factors associated with readmission after pediatric cardiothoracic surgery. *Ann Thorac Surg*. 2012;94:865-73.
2. Noma M, Hirata Y, Hirahara N, Suzuki T, Miyata H, Hiramatsu Y, et al. Pericardial effusion after congenital heart surgery. *J Thorac Cardiovasc Surg Open*. 2022;9:237-43.
3. Elias MD, Glatz AC, O'Connor MJ, Schachtner S, Ravishankar C, Mascio CE, et al. Prevalence and risk factors for pericardial effusions requiring readmission after pediatric cardiac surgery. *Pediatr Cardiol*. 2017;38:484-94.
4. Desai M, Yerebakan C. Commentary: less bloody and bloodless cases. *Semin Thorac Cardiovasc Surg*. 2021;33:513-4.
5. Adrichem R, Le Cessie S, Hazekamp MG, Van Dam NA, Blom NA, Rammeloo LA, et al. Risk of clinically relevant pericardial effusion after pediatric cardiac surgery. *Pediatr Cardiol*. 2019;40:585-94.
6. Zhao J, Cheng Z, Quan X, Zhao Z. Does posterior pericardial window technique prevent pericardial tamponade after cardiac surgery? *J Int Med Res*. 2014;42:416-26.
7. Lawrence EJ, Nguyen K, Morris SA, Hollinger I, Graham DA, Jenkins KJ, et al. Economic and safety implications of introducing fast tracking in congenital heart surgery. *Circ Cardiovasc Qual Outcomes*. 2013;6:201-7.
8. Checchia PA, Bronicki RA, Muenzer JT, Dixon D, Raithel S, Gandhi SK, et al. Nitric oxide delivery during cardiopulmonary bypass reduces postoperative morbidity in children—a randomized trial. *J Thorac Cardiovasc Surg*. 2013;146:530-6.