Predicting postoperative pulmonary complications: The answer may be right in front of our noses!

Kyle W. Riggs, MD, and David L. S. Morales, MD

From the Department of Cardiothoracic Surgery, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio.

Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication Oct 19, 2017; accepted for publication Oct 27, 2017; available ahead of print Dec 9, 2017.

Address for reprints: Kyle W. Riggs, MD, Department of Cardiothoracic Surgery, Cincinnati Children's Hospital Medical Center, 3333 Burnet Ave, Cincinnati, OH 45229 (E-mail: kyle.riggs@cchmc.org).

J Thorac Cardiovasc Surg 2018;155:764

0022-5223/\$36.00

Copyright © 2017 by The American Association for Thoracic Surgery

<https://doi.org/10.1016/j.jtcvs.2017.10.116>

Kyle W. Riggs, MD, and David L. S. Morales, MD

Central Message

In infants undergoing congenital heart surgery, abnormal preoperative testing for nasal nitric oxide content and nasal epithelial ciliary motion predicts postoperative morbidity.

See Article page 755.

Stewart and colleagues¹ present an insightful follow-up to their previous work examining ciliary dysfunction in children undergoing surgery for congenital heart disease (CHD) both with and without heterotaxy.² They investigate a nonheterotaxy infant population undergoing congenital heart surgery from 2010 to 2014. They preoperatively tested for nasal nitric oxide (nNO) content and epithelial ciliary motion (CM), 2 commonly used tests to assess for ciliary dysfunction. They demonstrated that this cohort had a high incidence of abnormal CM (32%), which correlated to an increased risk for postoperative respiratory morbidity, namely the use of noninvasive positive pressure ventilation, respiratory medications, and viral respiratory infections. Notably, abnormal CM did not correlate with longer intubation times.

The authors were not using these tests to assess for primary ciliary dyskinesia, which has both abnormal CM and low nNO. Rather, they sought to use the tests as a surrogate for overall ciliary dysfunction.¹ As predicted, abnormal CM was associated with pulmonary morbidity, but isolated low nNO was not associated with pulmonary morbidity. However, it did predict diminished systolic function pre- and postoperatively. The authors do not define abnormal, leaving readers to wonder whether this was clinically significant. This unexpected finding tugs the conclusion of this study in different directions and, unfortunately, detracts from the central theme, which is whether these tests can or cannot be used to predict postoperative pulmonary morbidity.

Nonetheless, the study found that more than 30% of infants had either abnormal CM or low nNO levels that correlated with postoperative outcomes, making this study clinically relevant. However, one should be careful not to generalize the results beyond an infant population, the vast majority of whom were hospitalized preoperatively. The inpatient infant population in this study may account for the higher incidence of abnormal CM and nNO tests

because they may be more ill, most of them not being able to leave a hospital without cardiac surgery.

Stewart and colleagues' impressive acquisition of data and extensive analysis confirm the association of abnormal CM and increased postoperative respiratory morbidity in nonheterotaxy infants undergoing surgery for CHD and raises questions regarding the utility of noninvasive screening tests to identify targets for therapy. It is important to consider abnormal CM as the cause of pulmonary symptoms in these patients rather than blindly attributing pulmonary complications to their CHD. The finding of low nNO levels associated with reduced systolic function, rather than ciliary dysfunction, presents another intriguing target for further investigation and potential future intervention. This group should be applauded for finally investigating the influence of these screening tests that have been right in front of our noses for quite some time, in an attempt to examine yet another approach at improving outcomes in children undergoing congenital heart surgery.¹

References

1. Stewart E, Adams PS, Tian X, Khalifa O, Wearden P, Zahid M, et al. Airway ciliary dysfunction: Association with adverse postoperative outcomes in nonheterotaxy congenital heart disease patients. *J Thorac Cardiovasc Surg*. 2018;155:755-63.e7.
2. Garrod AS, Zahid M, Tian X, Francis RJ, Khalifa O, Devine W, et al. Airway ciliary dysfunction and sinopulmonary symptoms in patients with congenital heart disease. *Ann Am Thorac Soc*. 2014;11:1426-32.