regurgitation the TAPSE is significantly reduced after the BSPCA relative to preoperative values, as opposed to no significant change preoperatively and postoperatively in the patient groups with significant tricuspid regurgitation. Kasnar-Samprec and colleagues¹ also suggest that TAPSE is directly related to RV preload status. We want to mention that, in accordance with their data,¹ researches should be very careful in interpreting TAPSE values in the presence of significant tricuspid regurgitation (which provides afterload reduction as well as affecting preload), because there could be false-positive high TAPSE values in this condition. Significant tricuspid regurgitation might have a detrimental effect on the long-term outcome of the systemic RV in patients with HLHS, whereas in those patients (falsely) high TAPSE values are to be expected during the follow-up investigations. Longitudinal assessment of the TAPSE for individual patients should help show interval changes in RV systolic function with time in those patients with falsely high TAPSE values. Kasnar-Samprec and colleagues¹ support the notion that the RV is highly susceptible to postoperative function impairment in pediatric patients with a systemic RV.

We thank Kasnar-Samprec and colleagues¹ for addressing the need for careful and systematic evaluation of the RV in patients with HLHS before and after bidirectional superior cavopulmonary anastomosis. We hope that with more interesting studies like this one, quantification of systemic RV function will become an routine measurement in patients with HLHS.

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References

1. Kasnar-Samprec J, Kühn A, Hörer J, Vogt M, Cleuziou J, Lange R, et al. Unloading of right ventricle by bidirectional superior cavopulmonary anastomosis in hypoplastic left heart syndrome patients promotes remodeling of systemic right ventricle but does not improve tricuspid regurgitation. *J Thorac Cardiovasc Surg.* 2012;144:1102-9.
2. Klitsie LM, Hazekamp MG, Roest AA, Van der Hulst AE, Gesink-van der Veer BJ, Kuipers IM, et al. Tissue Doppler imaging detects impaired biventricular performance shortly after congenital heart defect surgery. *Pediatr Cardiol.* September 22, 2012 [Epub ahead of print].
3. Koestenberger M, Nagel B, Avian A, Ravekes W, Sorantin E, Cvirn G, et al. Systolic right ventricular function in children and young adults with pulmonary artery hypertension secondary to congenital heart disease and tetralogy of Fallot: tricuspid annular plane systolic excursion (TAPSE) and magnetic resonance imaging data. *Congenit Heart Dis.* 2012; 7:250-8.
4. Koestenberger M, Nagel B, Ravekes W, Avian A, Heinzl B, Fandl A, et al. Tricuspid annular peak systolic velocity (S') in children and young adults with pulmonary artery hypertension secondary to congenital heart diseases, and in those with repaired tetralogy of Fallot: echocardiography and MRI data. *J Am Soc Echocardiogr.* 2012;25:1041-9.

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Reply to the Editor:

We thank Koestenberger and Ravekes for their kind comments on our article. They emphasized the importance of tricuspid annular plane systolic excursion as a marker of right ventricular (RV) function.

As we stated in our Methods section, subjective “eyeballing” by an experienced pediatric cardiologist and ultrasonographer was the method for quantification of RV function. Although this is certainly not the criterion standard in determining the RV function, it has its value in the hands of an experienced observer. Bellsham-Revell and associates¹ demonstrated a good correlation between eyeballing in echocardiography and RV functional analysis by magnetic resonance

imaging in patients with hypoplastic left heart syndrome (HLHS).

We would be very cautious in the interpretation of reduced tricuspid annular plane systolic excursion values in children with HLHS as a real indicator of an impaired RV function. Publications comparing quantitative echocardiographic parameters of RV function in patients with HLHS against the values in healthy subjects are scarce. The systemic RV in HLHS might be significantly different from the RV in a normal biventricular heart not only in ventricular geometry but in its function as well because of different interventricular interactions. It is not certain whether it is reasonable to compare a systemic RV in a univentricular heart with the RV in a biventricular circulation or whether it is better to compare it with the left ventricle.

Most data on ventricular function in HLHS compare the parameters before and after a given medical intervention. Petko and coworkers² found a reduction in RV global and regional longitudinal strain as well as a reduction of tricuspid annular plane systolic excursion after the Norwood operation, although they found no change in RV fractional area change. They were not able to discern any patient-specific or surgical factors to explain this finding. Ugaki and associates³ found reductions in RV end-diastolic area and RV fractional area change after tricuspid valve repair in patients with HLHS. It is clear that in this case the RV function could have been affected by the surgical procedure itself.

As Koestenberger and Ravekes confirmed, it is essential to interpret the parameters of the RV function in the patients with HLHS in the context of the loading condition under which the systemic RV is working. Further studies are necessary to evaluate RV function more thoroughly in this patient group by adding modern techniques, such as

2-dimensional speckle tracking and
3-dimensional echocardiography.

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References

1. Bellsham-Revell HR, Simpson JM, Miller OI, Bell AJ. Subjective evaluation of right ventricular systolic function in hypoplastic left heart syndrome: how accurate is it? *J Am Soc Echocardiogr*. 2013;26:52-6.
2. Petko C, Uebing A, Furck A, Rickers C, Scheewe J, Kramer HH. Changes of right ventricular function and longitudinal deformation in children with hypoplastic left heart syndrome before and after the Norwood operation. *J Am Soc Echocardiogr*. 2011;24:1226-32.
3. Ugaki S, Khoo NS, Ross DB, Rebeyka IM, Adatia I. Tricuspid valve repair improves early right ventricular and tricuspid valve remodeling in patients with hypoplastic left heart syndrome. *J Thorac Cardiovasc Surg*. 2013;145:446-50.

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j.jtcvs.2013.02.035](http://dx.doi.org/10.1016/j.jtcvs.2013.02.035)

STAGED PERCUTANEOUS CORONARY INTERVENTION AND MINIMALLY INVASIVE VALVE SURGERY: RESULTS OF A HYBRID APPROACH TO CONCOMITANT CORONARY AND VALVULAR DISEASE To the Editor:

We read with great interest the recent publication by Santana and colleagues,¹ entitled "Staged Percutaneous Coronary Intervention and Minimally Invasive Valve Surgery: Results of a Hybrid Approach to Concomitant Coronary and Valvular Disease." A total of 65 patients who underwent staged percutaneous coronary intervention and minimally invasive cardiac surgery (MICS) valve surgery were compared with 51 patients who underwent combined valve/coronary artery bypass grafting. The authors are to be congratulated for their excellent short-term

results in the MICS group, particularly the lack of mortality. However, drawing conclusions between the 2 groups is problematic in that there were 6 different surgeons in the control group versus 1 surgeon in the MICS group. It is well known that mortality and morbidity rates in valve surgery are highly correlated to the caseload of the individual surgeon.² We would question if the 28% versus 1.5% cumulative incidence of adverse short-term outcomes, including death, stroke, and renal failure, in the control versus the experimental group is merely a reflection of this fact.

Another concern is 61 of 65 patients in the hybrid group had percutaneous coronary intervention of the left anterior descending artery before MICS, and only 55.5% of the stents were drug eluting. In view of the the well-documented durability of the left internal thoracic artery to the left anterior descending artery, with both its salutary impact on longevity and major adverse cardiac outcomes, are these patients possibly being shortchanged in the zeal to perform MICS?

We also noted that in the MICS mitral cohort, there was only a 58% repair rate (14/24) despite no mention of rheumatic causes. Other than 6 calcific mitral valves, it seems plausible that the repair rate should have been higher in the hands of such a high-volume surgeon. Again, perhaps the lack of adequate exposure inherent to a "4- to 5-cm" MICS incision compromised the ability to attain a satisfactory repair.

Finally, nowhere in the article was there any mention of atrial fibrillation (AF). It is unlikely that none of these patients would have any preoperative history of such. Ad and colleagues³ recently reported that only 40.6% of patients with a history of AF have it addressed at the time of concomitant heart surgery. Knowing the favorable effects of a concomitant Cox-maze on ejection fraction, stroke, and life span, as well as the fact that this procedure can be applied via a MICS

approach, the authors should reconsider their strategy in those patients with a significant history of AF.

We applaud this and other efforts to make cardiac surgery less invasive. However, suboptimal mitral repair rates and infrequent use of the left internal thoracic artery, as well as overlooking preoperative AF, may significantly compromise long-term patient outcomes.

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References

1. Santana O, Funk M, Zamora C, Escolar E, Lamas GA, Lamelas J. Staged percutaneous coronary intervention and minimally invasive valve surgery: results of a hybrid approach to concomitant coronary and valvular disease. *J Thorac Cardiovasc Surg*. 2012;144:634-9.
2. Bolling SF, Li S, O'Brien SM, Brennan JM, Prager RL, Gammie JS. Predictors of mitral valve repair: clinical and surgeon factors. *Ann Thorac Surg*. 2010;90:1904-11.
3. Ad N, Suri RM, Gammie JS, Sheng S, O'Brien SM, Henry L. Surgical ablation of atrial fibrillation trends and outcomes in North America. *J Thorac Cardiovasc Surg*. 2012;144:1051-60.

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j.jtcvs.2012.12.092](http://dx.doi.org/10.1016/j.jtcvs.2012.12.092)

ADENOSINE-PROCAINE CARDIOPLEGIA AND ADENOSINE-LIDOCAINE CARDIOPLEGIA: TWO SIDES OF THE SAME COIN?

To the Editor:

Jakobsen and colleagues¹ are to be congratulated for pursuing alternatives to supranormal potassium cardioplegia in cardiac surgery. Since a 15-year moratorium was placed on Melrose's hyperkalemic solution in the late 1950s, investigators in cardioprotection have attempted to find a method