We used resection and end-to-end anastomosis techniques for a huge left anterior descending coronary artery (LAD) aneurysm. We preferred end-to-end anastomoses for the LAD rather than the use of the left internal thoracic artery because the diameter of the LAD was 4 cm, so the use of the left internal thoracic artery could have led to a size mismatch and early graft failure. In this technique, to avoid of bleeding from the suture line or occlusion caused by traction on the LAD, we mobilized the LAD sufficiently and checked for any resulting tension after the anastomoses.⁴

The resection and end-to-end anastomosis technique can be applied with confidence and is a feasible choice among all the available techniques. Furthermore, this technique is advantageous because of native-to-native coronary anastomosis. A variety of surgical techniques should be considered for treatment of huge coronary artery aneurysms.

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References

1. Daralammouri Y, Fuhrmann J, Kunze T. Giant right coronary artery aneurysm with a huge intramural thrombus. *J Thorac Cardiovasc Surg.* 2013;146:1290-1.
2. Singh SK, Goyal T, Sethi R, Chandra S, Devenraj V, Rajput NK, et al. Surgical treatment for coronary artery aneurysm: a single-centre experience. *Interact Cardiovasc Thorac Surg.* 2013;17:632-7.
3. Li D, Wu Q, Sun L, Song Y, Wang W, Pan S, et al. Surgical treatment of giant coronary artery aneurysm. *J Thorac Cardiovasc Surg.* 2005;130:817-21.
4. Inan K, Ucak A, Onan B, Hastaoglu O, Temizkan V, Yilmaz AT. Combined surgical approach to multiple giant coronary artery aneurysms. *Heart Surg Forum.* 2009;12:E294-6.

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THE IMPORTANCE OF PULMONARY ARTERIAL PRESSURE FOR THE TREATMENT OF TRICUSPID REGURGITATION

To the Editor:

We read with great interest the report by Kim and colleagues,¹ in which they evaluated the outcomes of 51 patients who underwent tricuspid valve surgery for severe isolated tricuspid regurgitation (TR). They concluded that preoperative anemia, renal or hepatic dysfunction, right ventricular dilatation, and severe TR after tricuspid valve surgery were significant factors for determination of poor outcome.

TR is more often a secondary rather than a primary valve lesion and usually develops in association with pulmonary hypertension in patients with left-sided cardiac disease (functional TR). Pulmonary arterial pressure (PAP) increases during left-sided cardiac disease and causes elevation of right ventricular pressure. Secondary TR is a consequence of tricuspid annular dilatation and increased tricuspid leaflet tethering in relation to this right ventricular pressure overload. It is also possible to see functional TR in cases of increased PAP without left-sided cardiac disease (eg, asthma, chronic infection, smoking). In the evaluation of the study from Kim and colleagues,¹ we noted that the etiology of TR was unclear. Only 15.7% of patients reported a blunt chest trauma as the etiology. In addition, Kim and colleagues¹ also reported that none of the patients had significant left-sided cardiac disease. They did not report the value of PAP. The frequency of primary TR is thus uncertain. As we mentioned previously, PAP may be elevated for various reasons, and functional TR may occur through a mechanism other than primary valve lesion. Surgical approach to tricuspid valve repair and survival may be changed by the etiology of TR. Functional TR in response to

increasing PAP must be removed to reach a successful evaluation of valve surgery for primary TR. Kim and colleagues¹ reported preoperative right ventricular dilatation to be a criterion for poor outcome. Perhaps patients with right ventricular dilatation also had increased PAP. In addition, they reported moderate-to-severe TR in 41% of cases in a few years. This may have been occurred through the mechanism that we have discussed here.

We believe that PAP is a very valuable datum in the diagnosis and treatment of TR. Determination of the etiology of TR is essential for correct and complete treatment with good long-term results.

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Reference

1. Kim JB, Jung SH, Choo SJ, Chung CH, Lee JW. Clinical and echocardiographic outcomes after surgery for severe isolated tricuspid regurgitation. *J Thorac Cardiovasc Surg.* 2013;146:278-84.

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IMPAIRMENT OF TRICUSPID ANNULAR PLANE SYSTOLIC EXCURSION AND TRICUSPID ANNULAR PEAK SYSTOLIC VELOCITY AFTER ARTERIAL SWITCH OPERATION

To the Editor:

We read with interest the article "Left and right ventricular performance after arterial switch operation" by Klitsie and colleagues.¹ In our opinion, this is an interesting study describing the long-term effects of heart surgery on remodeling of the right ventricle (RV) and the left ventricle in children after the arterial switch operation for

transposition of the great arteries (TGA). Klitsie and colleagues¹ found a reduced tricuspid annular plane systolic excursion (TAPSE) and tricuspid annular peak systolic velocity (S') in their patients with TGA relative to control subjects and found that RV systolic performance, in contrast to left ventricular systolic performance, remained significantly impaired at a medium-term follow-up of 9 months. We completely agree with the findings of Klitsie and colleagues¹ that this decrease of RV systolic performance after surgical correction of TGA may be due to detrimental effects of heart surgery with cardiopulmonary bypass. In children who have undergone heart surgery for tetralogy of Fallot and ventricular septal defect, the TAPSE and S' values have been shown to be decreased and also to worsen continuously with time.^{2,3} After the arterial switch operation, Klitsie and colleagues¹ found that the RV systolic parameters S' and TAPSE as well as diastolic parameters were impaired at 1 day postoperatively with respect to preoperative values. Furthermore, all RV performance parameters remained impaired in patients relative to control subjects 9 months postoperatively. For the convenience of *Journal* readers, we would like to mention that a comparison of their TAPSE and S' data with available TAPSE and S' normal values and z scores^{4,5} would have improved the statistical power of their analysis.

Klitsie and colleagues¹ nicely support the notion that the RV is highly susceptible to postoperative functional impairment in patients with TGA. We thank them for addressing the need for careful and systematic evaluation of the RV in patients with TGA before and after surgical correction. We hope that with more interesting studies like this from Klitsie and colleagues,¹ quantification of systolic RV function will become a routine measurement

in the follow-up of patients with TGA.

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References

1. Klitsie LM, Roest AA, Kuipers IM, Hazekamp MG, Blom NA, Ten Harkel AD. Left and right ventricular performance after arterial switch operation. *J Thorac Cardiovascular Surg.* September 12, 2013 [Epub ahead of print].
2. 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.
3. Klitsie LM, Kuipers IM, Roest AA, Van der Hulst AE, Stijnen T, Hazekamp MG, et al. Disparity in right vs left ventricular recovery during follow-up after ventricular septal defect correction in children. *Eur J Cardiothorac Surg.* 2013;44:269-74.
4. Koestenberger M, Ravekes W, Everett AD, Stueger HP, Heinzl B, Gamillscheg A, et al. Right ventricular function in infants, children and adolescents: reference values of the tricuspid annular plane systolic excursion (TAPSE) in 640 healthy patients and calculation of z score values. *J Am Soc Echocardiogr.* 2009;22:715-9.
5. Koestenberger M, Nagel B, Ravekes W, Avian A, Heinzl B, Cvim G, et al. Reference values of tricuspid annular peak systolic velocity in healthy pediatric patients, calculation of z score, and comparison to tricuspid annular plane systolic excursion. *Am J Cardiol.* 2012;109:116-21.

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Reply to the Editor:

We thank Koestenberger and colleagues for their comments regarding our article, "Left and right ventricular performance after arterial switch operation,"¹ in which we reported right ventricular (RV) performance to remain impaired as late as 1 year after the arterial switch operation. In light of the prognostic importance of RV performance parameters for increased risk of cardiovascular events, this persistent deterioration warrants careful follow-up and further evaluation.

Koestenberger and colleagues suggest calculation of z scores of tricuspid annular plane systolic excursion (TAPSE) and RV annular peak systolic velocity (S') to improve the statistical power of our results. Both TAPSE and RV S' have been suggested to be age related.² Thus, as noted in our article,¹ the changes described in tissue Doppler imaging parameters preoperatively and 1 day postoperatively versus 1 year postoperatively may in part be age related. This age dependence does not affect the main conclusion of our article, the persistent impairment of RV performance, because age-matched controls were used for this analysis. We agree with Koestenberger and colleagues, however, that transformation of TAPSE and RV S' from absolute values to z scores, as previously defined,^{3,4} could yield additional insights into the changes observed in RV performance after the arterial switch operation.

Calculation of preoperative z scores yielded a mean $\pm$ SD TAPSE of 0.8 ± 1.6 and RV S' of 2.3 ± 2.2 . One day postoperatively, both TAPSE and RV S' z scores had significantly declined, yielding a mean TAPSE z score of -4.7 ± 0.9 and a mean RV S' z score of -3.4 ± 1.3 . One year postoperatively, z scores had slightly recovered (TAPSE, -2.0 ± 1.6 ; RV S', -1.5 ± 1.8) but remained low.

These z score calculations present a similar trend in RV performance during medium-term follow-up after the arterial switch operation to that described in our published article. Furthermore, these results confirm that RV performance was still impaired 1 year postoperatively. Previously, impairment of RV performance after cardiothoracic surgery with cardiopulmonary bypass has been described in several other subgroups of patients with congenital heart defects.⁵ In these studies, cardiopulmonary bypass was suggested have an important detrimental effect on both short- and medium-term postoperative RV performance values after cardiothoracic