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LACK OF INFLUENCE OF HETEROTAXY ON ARRHYTHMIA PREVALENCE AFTER INTRACARDIAC VERSUS EXTRACARDIAC FONTAN OPERATIONS

Reply to the Editor:

We thank Dr Rajanbabu for his comments. In response to these comments, we reanalyzed our cohort after removing the heterotaxy patients from both groups and the statistical results were the same. We therefore believe that the difference in the number of heterotaxy patients in the 2 groups did not influence our results.

We do, however, agree with his comment that transvenous pacing and transcatheter ablation are harder to perform after an extracardiac conduit operation. In light of our study results, the intracardiac tunnel may be the better operation from that point of view. Yet we caution that the follow-up in the 2 groups (particularly the extracardiac conduit cohort) in our study was short and that it may be wise to wait for longer follow-up before making definitive recommendations.

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A RECOMMENDATION FOR MODIFICATION OF THE HOURGLASS-SHAPED RESECTION TECHNIQUE FOR REPAIR OF TALL MITRAL VALVE POSTERIOR PROLAPSE

To the Editor:

We have read the article entitled "Hourglass-shaped resection technique for repair of tall mitral valve posterior prolapse" by Sawazaki and colleagues¹ with great interest. They have well described their novel method for repairing a high posterior leaflet of the mitral valve. They have adopted triangular resection for a posterior leaflet of normal height, and an hourglass resection for an excessively high posterior leaflet without annular plication. This simple and reproducible method may indeed improve outcomes of folding plasty and avoid the sacrifice of large amounts of useful leaflet tissue during annular plication.^{2,3} Short-term results of this reproducible technique seem promising.¹

However, when the technical details for this novel method are examined more closely, some questions may arise. For instance, if points B and E, which represent the midpoints of a posterior leaflet, were sutured to the annulus, as shown in Figure 1, such an approach has important drawbacks. We think that this maneuver may pull the annulus and cause narrowing of the leaflet width, resulting in a final shape that impedes formation of a new, normal-sized, and deeply coapted posterior scallop. Thus, we suggest that some refining modifications to improve this technique may aid in achievement of more

satisfactory outcomes and decrease postoperative morbidity and complications.

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ABOUT LEMONS AND LEMONADE

To the Editor:

We read with great interest the article on lung volume reduction surgery (LVRS) published by Decker and coworkers,¹ even though we found the results somewhat disappointing.

On one hand, the study provides a previously unknown nationwide overview on the early outcome achieved with LVRS, taking into account the Society of Thoracic Surgeons database data; Decker and coworkers¹ underline that LVRS continues to be reportedly underused despite its proven efficacy and highlight the need to invest in future analyses to identify determinants of adjusted

FIGURE 1. Mr G.A. (left), who underwent staged unilateral LVRS at the Department of Thoracic Surgery of the Tor Vergata University in 1997, with Dr Pompeo (right).

surgery-specific quality assessments. On the other hand, the overall message that is picked up is that even though patients in the Society of Thoracic Surgeons database were younger, underwent thoracoscopic LVRS more frequently, and had a better forced expiratory volume in 1 second than patients in the National Emphysema Treatment Trial, 30-day mortality was 3% higher than in the National Emphysema Treatment Trial subset of patients not at high risk.¹

Clearly, the analysis is innocent and mathematically unequivocal. Yet, because of some duly acknowledged limitations, it provides only one piece of the puzzle. In fact, when looking at the outcome of LVRS, the main outcomes measured should investigate how much and for how long the patient's exercise capacity, respiratory function and, ultimately, quality of life can be improved. In addition, even when considering mortality alone,

this aspect should be ideally analyzed longitudinally because it has been shown that although there is an initial not negligible operative mortality after LVRS, a significant survival advantage can be detected thereafter in the whole cohort.²

Nonetheless, we congratulate Decker and coworkers¹ on an interesting study that focuses our attention once more on a controversial and highly effective surgical procedure. The analysis of Decker and coworkers¹ underscores one of the main Achilles' heel of LVRS, namely the highly variable and as yet not negligible mortality, which probably represents one of the major determinants of the currently limited application of this treatment option.

To overcome this impasse, novel nonresectional surgical and bronchoscopic methods aimed at ensuring long-term benefits equivalent to those of resectional LVRS, yet with reduced

mortality and morbidity, are being actively investigated. We developed an original surgical nonresectional LVRS method that is optimally suited to be performed thoracoscopically, is technically simpler than its resectional counterpart, does not entail any loss of lung tissue, and can be easily performed in conscious patients. By using this method and privileging a staged unilateral strategy of treatment, we have achieved a 30-day mortality of zero in the last 100 patients to undergo this operation. We also achieved a median hospital stay of 6 days in 66% of the patients to undergo this operation, along with median improvements in forced expiratory volume in 1 second, 6-minute walking test, and SF-36 health survey physical functioning score of 269 mL, 92 m, and 31 points, respectively.³

As a result, we believe that because of the worldwide burden of emphysema and the increasing demand for viable treatment options for end-stage disease, evolutionary LVRS methods should merit further thorough investigation.

In conclusion, we agree with the adage recalled by Cooper⁴ in his editorial comment in the *Journal*. Indeed, visiting patients who underwent LVRS more than 17 years ago (Figure 1) who continue to enjoy life reinforces our feeling that, confronted with lemons, thoracic surgeons can offer an appreciable lemonade.⁴

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OUTCOMES FOR LVRS: FINDING THE CORRECT LEMONADE RECIPE

Reply to the Editor:

I thank Pompeo and colleagues for their comments regarding our article and their insights on lung volume reduction surgery (LVRS). I also congratulate them on their excellent results in this difficult patient population with an innovative technique. We and our patients have benefited greatly from the sentinel work of Pompeo's group with this disease. Our Society of Thoracic Surgeons (STS) database investigation of LVRS procedures from 2003 through 2011 was in no way meant to dissuade thoracic surgeons from applying this proven therapy, but rather was intended to assess the current state of LVRS's utilization and outcomes in the United States. The STS database has been integral in evaluating outcomes and defining and improving performance standards for procedures in our discipline ranging from coronary artery bypass grafting to lobectomy. Now more than a decade since the initial publication of the National Emphysema Treatment Trial (NETT) data, my coauthors and I believed that it was time to assess LVRS outcomes in a systematic way. Our effort was

particularly motivated by what we perceived as a lack of enthusiasm for the procedure in both the pulmonology and surgical communities. Since the adoption of the Lung Allocation Score for distribution of donor lungs and the subsequent shift in recipients toward a population with fibrotic lung disease, our institution has seen an increasing need for alternative strategies for patients with emphysema. The University of Wisconsin Advanced Lung Disease Program has aggressively applied LVRS in the population with emphysema as a definitive therapy, as opposed to a bridge to transplant. In a review of our institutional data between 2008 and 2014, the 30- and 90-day mortalities were both zero, and the 3-year survival was 96.7% (2008-2012). Postprocedure forced expiratory volume in 1 second, beginning with an average of 790 mL (26% of predicted), increased 480 mL, or an average of 60% above baseline. We have found that the mechanical and subjective improvements were durable, and no patients have crossed over to transplantation since 2008. Our results, similar to those of Pompeo's group, are from a single institution with a mature, robust, and multidisciplinary LVRS program.

The STS database is focused on 30-day outcomes. We concede that the database interrogation does not tell the whole story, especially with regard to the impact of LVRS on long-term survival. We ask this question: Can we expect the outcomes from this STS database query to match the NETT outcomes that have been generated in a more restricted and controlled trial format? In the STS cohort, 27% of patients had absolute exclusion criteria (coronary artery disease or previous chest surgery) to enrollment in the NETT. Hypertension was a potential exclusion from the NETT if it was severe, and it was present as a comorbid condition in 45% of the

STS cohort. In addition, we do not have data regarding the preoperative preparation, including smoking cessation or pulmonary rehabilitation requirements. Perhaps most importantly, the database does not differentiate high-volume, multidisciplinary programs from lower-volume centers. We would expect, as with cancer resection or congenital cardiac surgery, that a relationship exists between volume and mortality.^{1,2} This STS review can help to set expectations for real clinical practice, versus a single-center series or the more constrained patient population included in a clinical trial. As we stated in the article, a more robust review of relative performance measurements for LVRS would allow programs to compare their performance with others and potentially learn from high-performing organizations, such as Pompeo's group. The addition of long-term outcomes, such as 5-year survival, is planned for the STS database and will ultimately provide data regarding longevity of these patients albeit not regarding their quality of life. Both within the United States and internationally, thoracic surgeons who perform LVRS would benefit from a collaborative registry. Without such a tool, it will be difficult to accurately compare outcomes of LVRS with those of evolving and existing bronchoscopic therapies. I very much look forward to seeing the results of multi-institution trials confirming the excellent results documented in single-institution series such as that of Pompeo and colleagues. At the University of Wisconsin, we will continue to aggressively use LVRS to treat a highly selected cohort in an effort to improve the quality of life and increase the longevity of our patients.

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