expression during chicken embryogenesis: detection of an embryonic isoform. *Dev Dyn*. 2001;221:460-3.

5. Jones JA, Beck C, Barbour JR, Zavadzkas JA, Mukherjee R, Spinale FG, et al. Alterations in aortic cellular constituents during thoracic aortic aneurysm development: myofibroblast-mediated vascular remodeling. *Am J Pathol*. 2009;175:1746-56.
6. Slomp J, Gittenberger-de Groot AC, Glukhova MA, van Munsteren JC, Kockx MM, Schwartz SM, et al. Differentiation, dedifferentiation, and apoptosis of smooth muscle cells during the development of the human ductus arteriosus. *Arterioscler Thromb Vasc Biol*. 1997;17:1003-9.
7. Grewal N, Gittenberger-de-Groot AC, DeRuiter MC, Klautz RJM, Poelmann RE, Duim SN, et al. Bicuspid aortic valve: phosphorylation of c-Kit and downstream targets are prognostic for future aortopathy. *Eur J Card Thor Surg*. August 26, 2014 [Epub ahead of print].
8. Cotrufo M, Della CA, De Santo LS, Quarto C, De Feo M, Romano G, et al. Different patterns of extracellular matrix protein expression in the convexity and the concavity of the dilated aorta with bicuspid aortic valve: preliminary results. *J Thorac Cardiovasc Surg*. 2005;130:504-11.
9. Mohamed SA, Noack F, Schoellermann K, Karluss A, Radtke A, Schult-Badusche D, et al. Elevation of matrix metalloproteinases in different areas of ascending aortic aneurysms in patients with bicuspid and tricuspid aortic valves. *ScientificWorldJournal*. 2012;2012:806261.
10. Bökenkamp R, Raz V, Venema A, DeRuiter MC, van Munsteren C, Olive M, et al. Differential temporal and spatial progerin expression during closure of the ductus arteriosus in neonates. *PLoS One*. 2011;6:e23975.
11. Olive M, Harten I, Mitchell R, Beers JK, Djabali K, Cao K, et al. Cardiovascular pathology in Hutchinson-Gilford progeria: correlation with the vascular pathology of aging. *Arterioscler Thromb Vasc Biol*. 2010;30:2301-9.
12. Ragnauth CD, Warren DT, Liu Y, McNair R, Tajsic T, Figg N, et al. Prelamin A acts to accelerate smooth muscle cell senescence and is a novel biomarker of human vascular aging. *Circulation*. 2010;121:2200-10.

<http://dx.doi.org/10.1016/j.jtcvs.2014.09.008>

MINIMALLY INVASIVE FULL BIATRIAL COX MAZE IV: WE ARE GOING IN THE RIGHT DIRECTION

To the Editor:

I read with great interest the article by Lawrance and colleagues,¹ and I congratulate them on this very interesting and well-written article. They have shown that the Cox maze IV procedure, with its inherent variations, can be performed by means

of a less invasive right anterolateral minithoracotomy with excellent outcome. My personal preference is for the classic standard “cut-and-sew” Cox maze III procedure. Once the surgeon has acquired technical expertise, this procedure is both easy and safe to do. What is truly important is not the complexity of the procedure, but rather the aortic crossclamp time. This is the rub, and this is why alternative energy sources for atrial fibrillation surgery have mushroomed in recent years. Since 2002, this has been termed as Cox maze IV procedure. Damiano and his working group² have been pioneers in this technology. The idea proposed by Lawrance and colleagues¹ looks promising. In addition to the minimally invasive surgery, they used the only 2 energy sources that have been proved to be successful achieving full transmural lesions in the atria, bipolar radiofrequency and cryoablation. This great effort by Lawrance and colleagues¹ in this article highlights that the trend is now toward the idea conceived by Cox³ 11 years ago. He stated that surgery for atrial fibrillation should meet the following conditions: (1) the procedure should preferably be epicardial by nature; (2) the energy source should be capable of penetrating epicardial fat and ablating all types of atrial fibrillation; (3) cardiopulmonary bypass must be avoided; (4) the procedure should be amenable to endoscopic or minimally invasive techniques; (5) it should be performed in less than 1 hour; and (6) hospital discharge should be possible on the first postoperative day. Although it is true that not all these objectives have been achieved, we must recognize that we are on the right track. Novel devices are being developed^{4,5}; as yet, however, transmural lesions have not been safely produced on the beating heart by epicardial ablation. Unfortunately, cardiopulmonary bypass remains a crucial aspect to perform this kind of procedure. The

most important point is that we are going on the right direction, each moment getting closer to the goal. I really congratulate Lawrance and colleagues¹ for this fine and great effort.

Ovidio A. Garcia-Villarreal, MD
Department of Cardiac Surgery
Hospital of Cardiology UMAE 34
Instituto Mexicano del Seguro Social
Monterrey, Mexico

References

1. Lawrance CP, Henn MC, Miller J, Sinn LA, Schuessler RB, Maniar HS, et al. A minimally invasive Cox-Maze IV is as effective as sternotomy while decreasing major morbidity and hospital stay. *J Thorac Cardiovasc Surg*. June 6, 2014 [Epub ahead of print].
2. Damiano RJ Jr, Badhwar V, Acker MA, Veeragandham RS, Kress DC, Robertson JO, et al. The CURE-AF trial: a prospective, multicenter trial of irrigated radiofrequency ablation for the treatment of persistent atrial fibrillation during concomitant cardiac surgery. *Heart Rhythm*. 2014;11:39-45.
3. Cox JL. Atrial fibrillation II: rationale for surgical treatment. *J Thorac Cardiovasc Surg*. 2003;126:1693-9.
4. Sakamoto S, Voeller RK, Melby SJ, Lall SC, Chang N, Schuessler RB, et al. Surgical ablation for atrial fibrillation: The efficacy of a novel bipolar pen device in the cardiologically arrested and beating heart. *J Thorac Cardiovasc Surg*. 2008;136:1295-301.
5. Watanabe Y, Weimar T, Kazui T, Lee U, Schuessler RB, Damiano RJ Jr. Epicardial ablation performance of a novel radiofrequency device on the beating heart in pigs. *Ann Thorac Surg*. 2014;97:673-8.

<http://dx.doi.org/10.1016/j.jtcvs.2014.07.017>

RUPTURE OF EXPANDED POLYTETRAFLUOROETHYLENE NEOCHORDAE USED FOR MITRAL VALVE REPAIR: DOES SIZE MATTER?

To the Editor:

In a report published in another journal in 2007,¹ we reported 2 cases of rupture of synthetic chordae tendineae (expanded polytetrafluoroethylene [ePTFE]). We also analyzed the possible causes of what was then considered an extremely rare finding, which had first been reported by Buttany and