



## CARDIOVASCULAR FLASHLIGHT

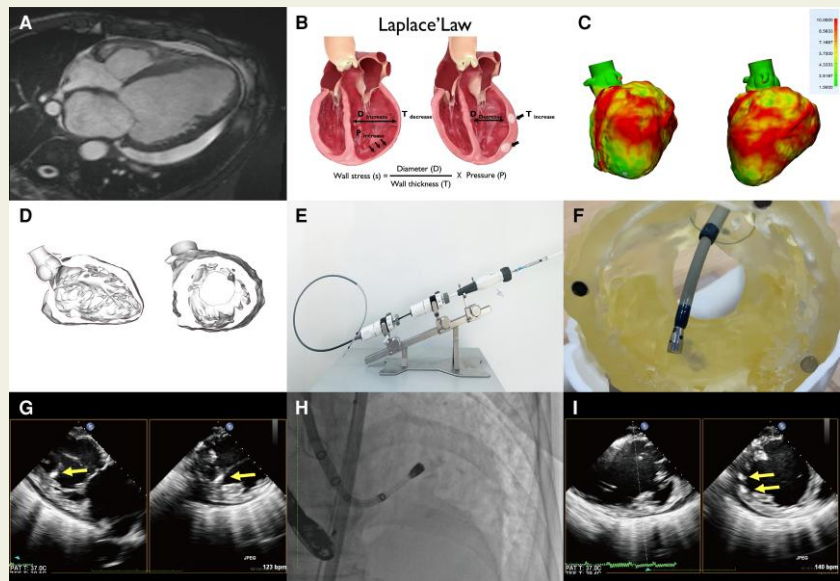
<https://doi.org/10.1093/eurheartj/ehac671>

Online publish-ahead-of-print 24 November 2022

# First-in-human transcatheter endocardial alginate-hydrogel implantation for the treatment of heart failure

Bo Wang <sup>1</sup>, Randall J. Lee<sup>2</sup>, and Ling Tao <sup>1\*</sup><sup>1</sup>Department of Cardiology, Xijing Hospital, Changle Road, 710032, Xi'an, China; and <sup>2</sup>Department of Medicine, University of California-San Francisco, 505 Parnassus Ave, 94143, San Francisco, CA, USA\*Corresponding author. Email: [lingtao@fmmu.edu.cn](mailto:lingtao@fmmu.edu.cn)

A 55-year-old male with dilated cardiomyopathy presented with decompensated heart failure (HF). Magnetic resonance imaging (MRI) revealed left ventricular (LV) enlargement (Panel A). The LV ejection fraction (LVEF), end-diastolic volume index (EDVI), and end-systolic volume index (ESVI) were 16%, 234 and 196.8 mL/m<sup>2</sup>, respectively. The heart team enrolled him in our clinical trial (NCT04781660), designed to evaluate the feasibility and safety of transcatheter endocardial alginate hydrogel implantation (TEAi) for treating HF. The concept of LV augmentation with the alginate hydrogel (AH) uses Laplace's law (Panel B), which increases the LV wall's thickness, reduces the wall stress, and improves cardiac function.<sup>1–5</sup> Three-dimensional printing techniques were used to evaluate the LV wall thickness (Panels C and D) and to simulate the procedure (Panel F). An 18-F guiding catheter was inserted via the femoral artery and guided crossing the aortic valve under fluoroscopy. Injections were performed with a steerable, dual-lumen needle catheter (Panel E). Transesophageal echocardiography was used to locate the injection sites. The tip of the catheter reached the endocardium (Panel G, arrow), and contrast was injected into the LV wall to identify no leakage or perforation (Panel H). The AH was injected into the myocardium at the mid-LV free wall for 10 sites and 3 ml (Panels I, arrow). Six-month following the procedure, the patient's clinical status was significantly improved (NYHA Class II). MRI confirmed that the LVEF was 22%, with a reduction in EDVI (188.25 mL/m<sup>2</sup>) and ESVI (146.36 mL/m<sup>2</sup>). This case demonstrated that TEAi could be effectively and safely performed.



**Conflict of interest:** Dr Bo Wang has nothing to disclose. Dr Randall J. Lee has nothing to disclose. Dr Ling Tao has nothing to disclose.

The data underlying this article will be shared on reasonable request to the corresponding author.

1. Yu J, Christman KL, Chin E, Sievers RE, Saeed M, Lee RJ. Restoration of left ventricular geometry and improvement of left ventricular function in a rodent model of chronic ischemic cardiomyopathy. *J Thorac Cardiovasc Surg* 2009;**137**:180–187. <https://doi.org/10.1016/j.jtcvs.2008.08.036>
2. Sabbah HN, Wang M, Gupta RC, Rastogi S, Ihsar I, Sabbah MS, et al. Augmentation of left ventricular wall thickness with alginate hydrogel implants improves left ventricular function and prevents progressive remodeling in dogs with chronic heart failure. *JACC Heart Fail* 2013;**1**:252–258. <https://doi.org/10.1016/j.jchf.2013.02.006>
3. Lee RJ, Hinson A, Bauernschmitt R, Matschke K, Fang Q, Mann DL, et al. The feasibility and safety of Algisyl-LVR™ as a method of left ventricular augmentation in patients with dilated cardiomyopathy: initial first in man clinical results. *Int J Cardiol* 2015;**199**:18–24. <https://doi.org/10.1016/j.ijcard.2015.06.111>
4. Anker SD, Coats AJ, Cristian G, Dragomir D, Pusineri E, Piredda M, et al. A prospective comparison of alginate-hydrogel with standard medical therapy to determine the impact on functional capacity and clinical outcomes in patients with advanced heart failure (AUGMENT-HF trial). *Eur Heart J* 2015;**36**:2297–2309. <https://doi.org/10.1093/eurheartj/ehv259>
5. Mann DL, Lee RJ, Coats AJ, Neagoe G, Dragomir D, Pusineri E, et al. One-year follow-up results from AUGMENT-HF: a multicentre randomized controlled clinical trial of the efficacy of left ventricular augmentation with Algisyl in the treatment of heart failure. *Eur J Heart Fail* 2016;**18**:314–325. <https://doi.org/10.1002/ehf.449>

© The Author(s) 2022. Published by Oxford University Press on behalf of the European Society of Cardiology.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact [journals.permissions@oup.com](mailto:journals.permissions@oup.com)