



# Aortic regurgitation of the quadricuspid aortic valve: An ancient Chinese copper coin sign

Yang Chen,<sup>1,2</sup> Moyang Wang,<sup>1</sup> Guannan Niu,<sup>1</sup> and Yongjian Wu<sup>1,\*</sup>

<sup>1</sup>Department of Cardiology, Fuwai Hospital, National Center for Cardiovascular Disease, CAMS & PUMC, Beijing 100037, China

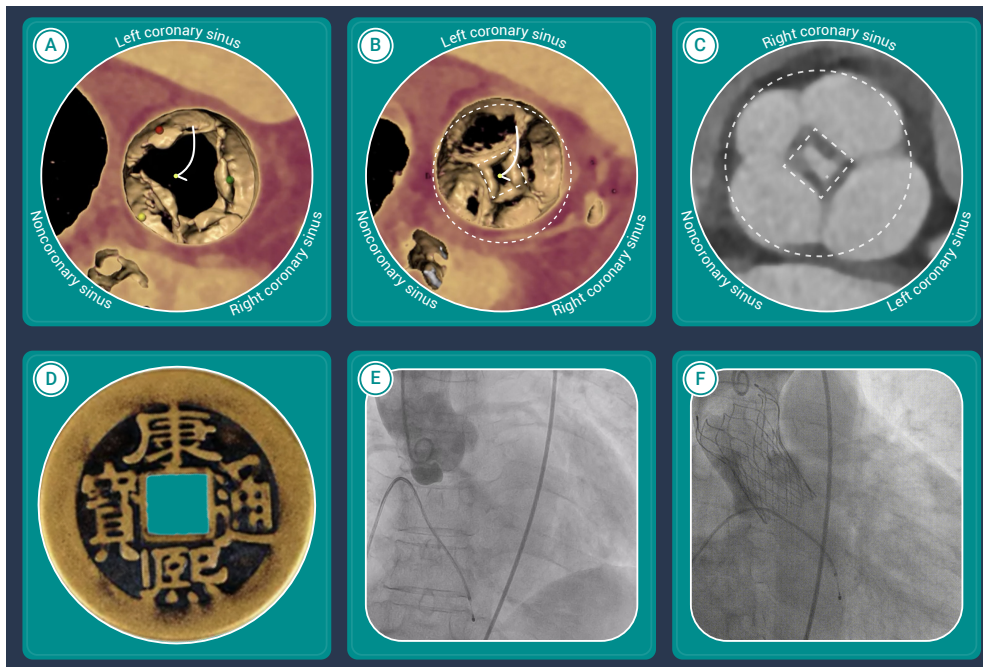
<sup>2</sup>Department of Cardiology, Peking University People's Hospital, Beijing 100044, China

\*Correspondence: wuyongjian@fuwai.com

Received: June 4, 2023; Accepted: November 15, 2023; Published Online: November 23, 2023; <https://doi.org/10.59717/j.xinn-med.2023.100035>

© 2023 The Author(s). This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Citation: Chen Y., Wang M., Niu G., et al., (2023). Aortic regurgitation of the quadricuspid aortic valve: An ancient Chinese copper coin sign. The Innovation Medicine 1(3), 100035.



**Figure 1. Aortic regurgitation of the quadricuspid aortic valve: An ancient Chinese copper coin sign** (A) Computed tomography reconstruction showed a quadricuspid aortic valve during systole. (B) Computed tomography reconstruction showed a quadricuspid aortic valve with incomplete cusp coaptation during diastole. (C) The formation of the quadricuspid aortic valve with incomplete cusp coaptation during diastole is very similar to that of an ancient Chinese copper coin. (D) An ancient Chinese copper coin. (E) Aortic root angiography indicated the central aortic regurgitation during diastole in this patient with quadricuspid aortic valve malformation. (F) This patient underwent transcatheter aortic valve replacement successfully with a 30 mm VitaFlow valve.

A 68-year-old woman had dyspnea and chest discomfort because of congestive heart failure with reduced left ventricular ejection fraction (40%). The transthoracic echocardiography showed severe aortic regurgitation with the regurgitant volume was 68 mL/beat, vena contracta width was 6.6 mm, and left ventricular end-diastolic and -systolic diameters were 75 mm and 62 mm respectively. The cardiovascular magnetic resonance confirmed the low left ventricular ejection fraction (29.8%). The N-terminal pro-B-type natriuretic peptide was 1796 pg/mL. CT angiography reconstruction revealed a quadricuspid aortic valve (Panel A) with incomplete cusp coaptation during diastole (Panel B and C), resulting in central aortic regurgitation, and showed mild dilatation of the ascending aorta (diameter, 38 mm) and the perimeter and diameter of aortic valve annulus was 78.5 mm and 25.0mm. The shape of the defect was very similar to that of an ancient Chinese copper coin that is round with square holes (Panel D). Aortic root angiography indicated the central aortic regurgitation during diastole in this patient with quadricuspid aortic valve malformation (Panel E). Based on these results, this patient underwent transcatheter aortic valve replacement successfully with a 30 mm VitaFlow valve (Panel F) according to the novel anatomic classification which was aimed to guide transcatheter aortic valve replacement for pure aortic regurgitation.<sup>1-3</sup>

Quadricuspid aortic valves are congenital valvular malformation, with an

aortic valve replacement for pure aortic regurgitation caused by quadricuspid aortic valve malformation is a novel treatment.<sup>1-3</sup>

## REFERENCES

1. Chen, Y., Lu, Z.N., Yao, J., et al. (2022) A novel anatomic classification to guide transcatheter aortic valve replacement for pure aortic regurgitation. *Echocardiography* **39**: 1571-1580. DOI: 10.1111/echo.15490.
2. Chen, Y., Ferdous, M.M., Kottu, L., et al. (2023) Can Measuring the 'Dual Anchors of Aorta' Enhance the Success Rate of TAVR?—A Single-Center Experience. *J. Clin. Med.* **12**: 1157-1174. DOI: 10.3390/jcm12031157.
3. Chen, Y., Zhao, J., Liu, Q., et al. (2023) Computed tomography anatomical characteristics based on transcatheter aortic valve replacement in aortic regurgitation. *Int. J. Cardiovasc. Imaging* **39**: 2063-2071. DOI: 10.1007/s10554-023-02908-9.

## FUNDING AND ACKNOWLEDGMENTS

This work was supported by the Chinese Academy of Medical Sciences Innovation Fund for Medical Sciences (2021-I2M-C&T-A-010). The funder had no role in study design, data collection and analysis, decision to publish or preparation of the manuscript.

## DECLARATION OF INTERESTS

The authors declare no competing interests.