

## Images in Cardiovascular Medicine



# Subclinical Thrombosis on Mechanical Aortic Valve: Should Cardiac Computed Tomography Be Included in Routine Evaluation?

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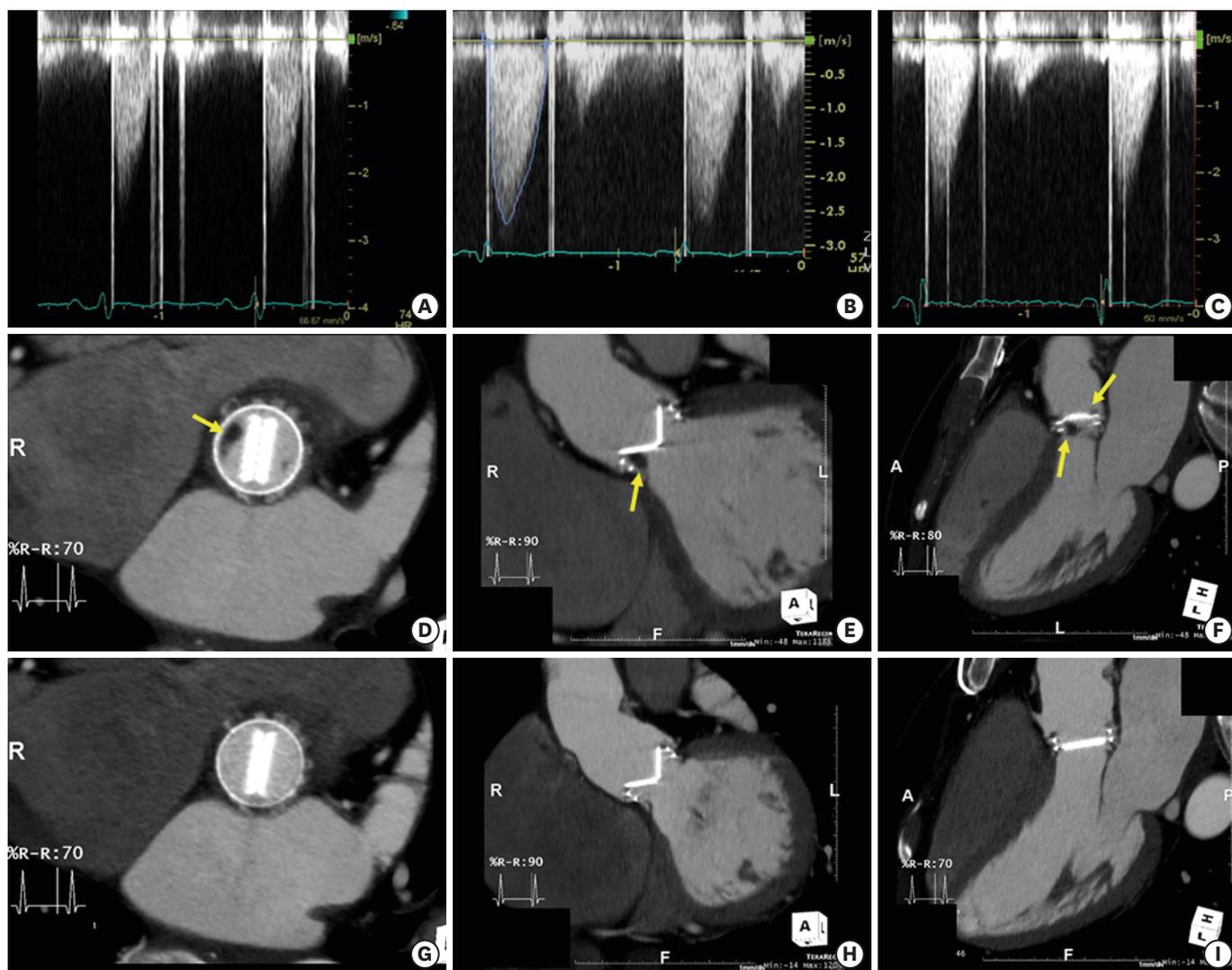
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A 42-year-old woman, who underwent aortic valve (AV) replacement with a 21 mm On-X valve and graft replacement of ascending aorta six months ago, visited out-patient clinic for a routine checkup. Her postoperative pre-discharge echocardiogram at six months ago showed normal left ventricular systolic function and normal reference range of the pressure gradient (PG) across the mechanical AV (peak/mean PG 20/11 mmHg) (**Figure 1A**). She had maintained sinus rhythm without systemic diseases or a history of taking oral contraceptives. During taking warfarin, international normalized ratio (INR) was checked every month, and maintained at 2.0–2.5. On routine follow-up echocardiography 6 months after surgery, the AV PG was slightly elevated to 29/17 mmHg and the acceleration time on the continuous wave Doppler was prolonged to 90 msec. Peak AV velocity was 2.7 m/sec (**Figure 1B**). On the same day, cardiac computed tomography (CT) was performed to evaluate the graft of the ascending aorta without suspicion of prosthetic valve abnormalities. Unexpectedly, a rounded low-attenuated structure on the right side of the mechanical AV was found (**Figure 1D-F**, **Supplementary Video 1**). After five days of intravenous unfractionated heparin therapy, the low attenuated structure disappeared on follow-up CT, and PG and acceleration time were normalized (**Figure 1C, G, and I**, **Supplementary Video 2**). Currently, she is taking aspirin once daily and warfarin (INR 2.5–3.0) without signs of systemic embolism. This case displays the role of cardiac CT in detecting subclinical prosthetic valve thrombosis,<sup>1-3)</sup> when the Doppler findings are out of the reference range but not diagnostic.



**Figure 1.** Echocardiography and cardiac computed tomography of subclinical mechanical valve thrombosis. (A) Continuous-wave Doppler of the mechanical aortic valve on postoperative pre-discharge echocardiogram. (B) Continuous-wave Doppler of the mechanical aortic valve on 6-month follow-up echocardiogram. (C) Continuous-wave Doppler of the mechanical aortic valve after intravenous unfractionated heparin therapy for 5 days. (D-F) Low attenuating mass lesions on the right side of the mechanical aortic valve on 6-month follow-up CT. (G-I) Resolution of mass lesions on the right side of the mechanical aortic valve on the follow-up CT after intravenous unfractionated heparin therapy for 5 days. CT = computed tomography.

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**Conflict of Interest**

The authors have no financial conflicts of interest.

**Data Sharing Statement**

The data required to reproduce these findings cannot be shared since this manuscript contains images of a single patient.

**SUPPLEMENTARY MATERIALS**

**Supplementary Video 1**

Subclinical mechanical aortic valve thrombus with mildly decreased opening angle (70.5 degrees).

[Click here to view](#)

**Supplementary Video 2**

Resolution of subclinical mechanical aortic valve thrombus with normalized opening angle (80.9 degrees) after intravenous unfractionated heparin therapy for 5 days.

[Click here to view](#)

**Author Contributions**

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**REFERENCES**

1. Andrews JPM, Cartledge TR, Dweck MR, Moss AJ. Cardiac CT in prosthetic aortic valve complications. *Br J Radiol* 2019;92:20180237.  
[PUBMED](#) | [CROSSREF](#)
2. Lim WY, Lloyd G, Bhattacharyya S. Mechanical and surgical bioprosthetic valve thrombosis. *Heart* 2017;103:1934-41.  
[PUBMED](#) | [CROSSREF](#)
3. Lim SJ, Koo HJ, Jung SC, et al. Sinus of Valsalva thrombosis detected on computed tomography after transcatheter aortic valve replacement. *Korean Circ J* 2020;50:572-82.  
[PUBMED](#) | [CROSSREF](#)