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IMAGES AND VIDEOS

Assessment of paravalvular leakage after transcatheter aortic valve implantation: add clinical signs to echocardiographic data

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Summary

A 62-year-old male with pulmonary fibrosis and aortic valve stenosis underwent TAVI (Corevalve Evolut XL 34 mm) in the build-up for lung transplantation (LuTx). Following post-dilation for a large annular perimeter, moderate paravalvular aortic regurgitation (AR) was observed (Video 1). After 6 weeks, he was admitted to the ICU with respiratory failure (Fig. 1A). TTE demonstrated residual mild AR (based on a small excentric paravalvular AR jet, <10% circumferential extent, pressure half-time was not reliably measured) and together with borderline elevated NT-pro-BNP, the consultant cardiologist authorized LuTx listing.

However, an abnormal radial arterial pressure waveform was noticed (Fig. 1B). Femoral artery Doppler ultrasound demonstrated holo-diastolic backflow (Duroziez's sign, Fig. 1C), which may indicate severe AR. Repeat biplane TTE confirmed 30% circumferential paravalvular AR (Fig. 1D, Videos 2 and 3) and descending aorta end-diastolic flow reversal >20 cm/s (Fig. 1E), consistent with the diagnosis.

The patient deteriorated rapidly. Given the shortage of donor organs, the option of LuTx after ECMO-assisted paravalvular leak closure (with unpredictable result) was deemed inappropriate. He died and autopsy was done (Fig. 1F).

Assessment of the severity of AR after TAVI is challenging. Determination of the circumferential extent of paravalvular AR assessed by TTE is regarded 'critical', but may be difficult (1, 2, 3, 4). Although transoesophageal echocardiography may be the default technique in case of uncertainty, this was impossible since this would have required mechanical ventilation, which can be very challenging in end-stage pulmonary fibrosis. In conclusion, clinical signs together with all possible echocardiography views are paramount for the diagnosis.

Video 1
Aortography at the time of the procedure, showing grade 3 aortic regurgitatation. View Video 1 at http://movie-usa.glencoesoftware.com/video/10.1530/ERP-17-0041/video-1.

Video 2
Parasternal long-axis view showing paravalvular aortic regurgitation through colour-Doppler at the TAVI stent inflow level. View Video 2 at http://movie-usa.glencoesoftware.com/video/10.1530/ERP-17-0041/video-2.

Video 3
Parasternal biplane view, colour-Doppler, showing paravalvular aortic regurgitation. View Video 3 at http://movie-usa.glencoesoftware.com/video/10.1530/ERP-17-0041/video-3.

Declaration of interest
The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of this article.

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Patient consent
This patient deceased, but permission for publication was obtained from next-of-kin.

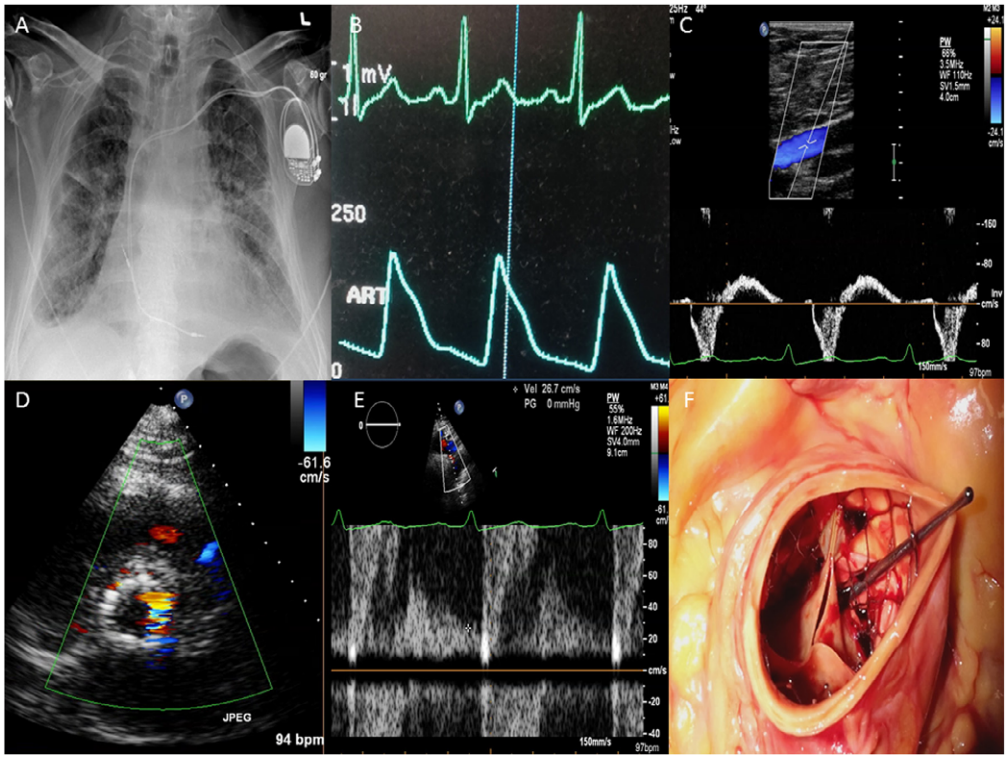

Figure 1
(A) Chest X-ray, reticular shadowing of lung parenchyma and pleural fluid; (B) Radial arterial pressure waveform, rapid upstroke, diminished dicrotic notch and wide pulse pressure (200/50 mmHg); (C) Doppler ultrasound of femoral artery, holo-diastolic flow reversal; (D) TTE, parasternal short-axis view, paravalvular AR; (E) TTE, suprasternal long-axis view of descending aorta, holo-diastolic flow reversal; (F) PA specimen of the TAVI seen from the ascending aorta, where a probe indicates the leak.

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References

1 Eskandari M & Monaghan M 2016 The old and the new: the pivotal role of TTE in TAVI. *Echo Research and Practice* **3** E1–E2. (doi:10.1530/ERP-16-0023)
2 Fryearson J, Edwards NC, Doshi SN & Steeds RP 2016 The role of TTE in assessment of the patient before and following TAVI for AS. *Echo Research and Practice* **3** R19–R34. (doi:10.1530/ERP-16-0004)
3 Geleijnse ML, Di Martino LF, Vletter WB, Ren B, Galema TW, Van Mieghem NM, de Jaegere PP & Soliman OI 2016 Limitations and difficulties of echocardiographic short-axis assessment of paravalvular leakage after corevalve transcatheter aortic valve implantation. *Cardiovascular Ultrasound* **14** 37. (doi:10.1186/s12947-016-0080-5)
4 Kappetein AP, Head SJ, Genereux P, Piazza N, van Mieghem NM, Blackstone EH, Brott TG, Cohen DJ, Cutlip DE, van Es GA, *et al.* 2012 Updated standardized endpoint definitions for transcatheter aortic valve implantation: the Valve Academic Research Consortium-2 consensus document. *Journal of the American College of Cardiology* **60** 1438–54. (doi:10.1016/j.jacc.2012.09.001)

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