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Infolding of self expanding valve due to loss of nitinol memory during transcatheter aortic valve implantation

Short title: Infolding of self expanding valve

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Classifications: Aortic stenosis; TAVI; Miscellaneous

Head and shoulders portrait of the first author:



A 78-year-old gentleman, had transcatheter aortic valve implantation using Evolut-R (Medtronic, Minneapolis, Minnesota) valve. On computed tomography the perimeter derived annulus diameter was 29.1mm (Panel-A). A 34mm Evolut-R was precisely loaded and the same was confirmed fluoroscopically before insertion into the sheath (Panel-B). The Evolut-R was recaptured twice due to unsatisfactory position. During the third release, following confirmation of annular position the valve was deployed. Post deployment the patient had cardiac arrest and prompt cardiopulmonary resuscitation was initiated. It was then noticed that in the previous cine frame at 85% deployment there was infolding of the valve frame which had been overlooked (Panel-C&video-1). The under-expansion of the valve frame led to non-functioning of the Evolut-R leaflets, which resulted in cardiac arrest (Panel-D&video-2). A swift post dilatation with 25mmX5cm Z-med-II balloon under rapid pacing expanded the valve completely with return of spontaneous circulation (Panel-E&F&video-3). The enface view of Evolut-R valve post procedure confirmed the optimal expansion (Panel-F & video-4). In one of the previous report infolding of the valve frame resulted in paravalvular leak but normally functioning valve[1]. In the second report infolding of valve frame was recognized before complete release of the valve, hence that was recaptured and a new

valve was implanted[2]. The nitinol memory of large self expanding valve (Evolut-R;34mm) can be lost, when there is severe annular calcium or prolonged exposure to higher core body temperature.

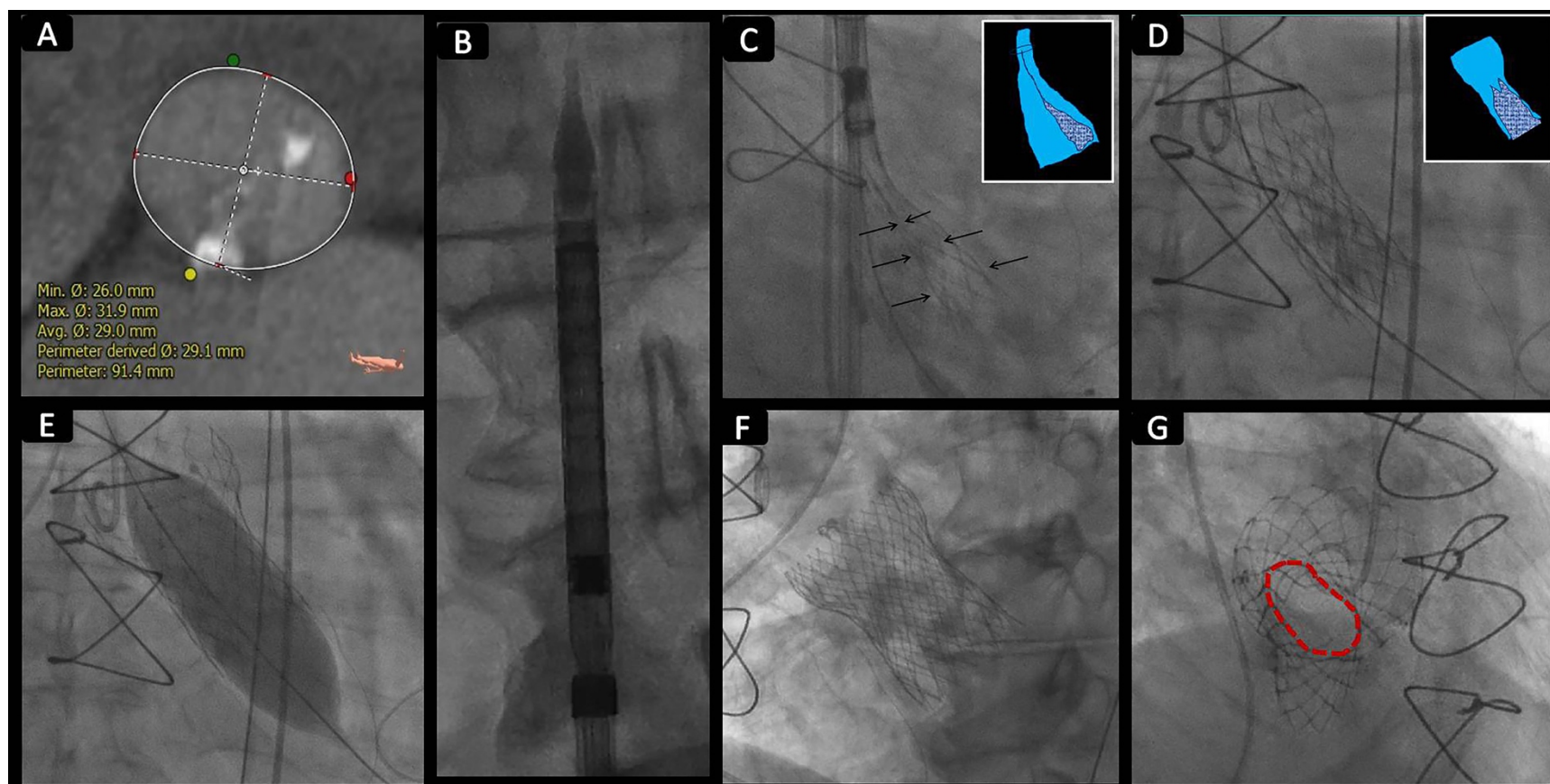
Conflict of interest: The authors do not have conflict of interest.

Figure legend:

[A] Computed tomography of aortic annulus shows calcium at clock positions 2 and 6. [B] Invitro fluoroscopic confirmation of the appropriately loaded 34mm Evolut-R valve system. [C] Infolding of the valve frame is shown in between the white arrows (dotted dark blue area in the cartoon insert). [D] Under-expanded valve frame after complete release of the valve (dotted dark blue area in the cartoon inset). [E] Balloon dilatation of the under-expanded valve frame with a 25mmX5cm Z-med-II balloon. [F] Complete expansion of the 34 mm Evolut-R valve. [G] The oval annulus of the completely expanded 34mm Evolut-R in enface view is shown as red dotted lines.

References:

- [1] Ben-Dor I, Rogers T, Satler LF, Waksman R. A word of caution using self-expanding trans-catheter aortic valve-frame infolding. *Catheter Cardiovasc Interv.*2019;93:555-558.
- [2] Abdelghani M, El Ghalban A, Landt M, Richardt G, Abdel-Wahab M. Invivo stent frame infolding of a self-expanding transcatheter aortic valve after resheathing. *JACC Cardiovasc Interv.*2018;11:1204-1206.



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Online supplement video legends:

Video-1: Infolding of the valve frame at 85% deployment

Video-2: Under-expanded valve frame after complete release of the valve.

Video-3: Post dilatation with 25x50mm Z-Med-II balloon

Video-4: Enface view of the completely expanded valve

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