

Supplementary material

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Online Appendix

Detailed measurements

Patient (#1)

MSCT annulus measurements were 2.16cmx2.82cm, 8.1cm (perimeter), and 4.84cm² (area). The aorta measurements at the level of the cusps were 2.94x3.11x3.31cm (sinus-to-commissure diameters) and 7.70cm²; at its narrowest lumen were 3.20x3.33x3.64cm and 9.14cm²; at the level of sinuses were 3.24x3.32x3.53cm and 9.25cm²; and at 45mm above the annulus measured 3.25x3.32cm and 8.49cm² (respectively). Corresponding baseline IVUS were as follows: at the annulus 19.3x27.7mm, 75.8mm and 417.1mm²; at the level of cusps 29.6x30.6x31.7mm and 736.2mm²; at its narrowest lumen cross-sectional area 31.7x31.8x32.6mm and 910.8mm²; at the level of the sinuses 33.6x33.7x35.4mm and 912.8mm²; and 45 mm height above the annulus plane 32.6x33.3mm and 822.8mm². Final THV inner inflow cross-sectional area was 78.3% of baseline annulus area (with its maximal diameter ratio being 92% of the maximal baseline annulus diameter). The corresponding THV inflow area expansion was 49% of that predicted from manufacturer's chart (with its maximal diameter ratio being 88% of that predicted). Final inner-THV frame cross-sectional areas measured at the nadir of leaflets and at the level of center of coaptation were 91% of that predicted from manufacturer's chart for both. The increase in the aortic root dimension during the TAVR procedure were 195mm² as assessed at the cusps base, 113mm² as assessed at the site of narrowest lumen, 135mm² as assessed at the level of sinuses, and 140mm² as assessed 45mm above the annulus plane.

Patient (#2)

Baseline MSCT annulus measurements were 1.98cm (minimum) x 2.34cm (maximum), 8.1cm (perimeter), and 4.11cm² (area). The bioprosthesis inner-ring dimensions were 1.95x2.10cm, 6.20cm, and 3.21cm² (with inner-distances between the bioprosthesis stent posts measured at the level of their upper points of 1.62x1.59x1.85cm). The aorta measurements at the level of the upper points of the stent posts were 3.05x3.54x3.17cm (sinus-to-commissure distances) and 8.30cm²; at the level of the sinuses 3.08x3.48x3.30cm and 8.60cm²; and 45mm above the annulus plane 3.29x3.55cm and 9.50cm² (respectively). Final IVUS inner THV inflow cross-sectional area measurements were 73.2% of baseline inner-ring area (and 56.3% of baseline annulus area); and its expansion was of 53% of that predicted from the manufacturer's chart (with its maximal diameter being 73.5% of that predicted). IVUS inner THV frame dimensions at the nadir of leaflets were of 89.5% of nominal, but at the level of center of coaptation were 109% of that predicted from the

manufacturer's chart (with its minimal diameter being larger than the predicted). THV outflow dimension measured by IVUS was 11% smaller than predicted.

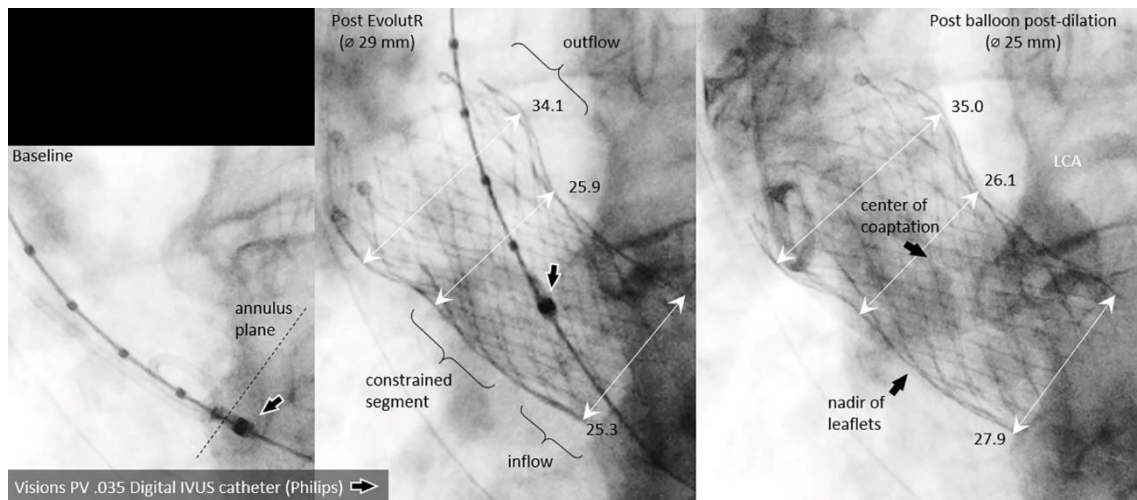


Figure S1. Angiography obtained during TAVR (patient #1), with representative THV outer-frame measurements (LCA – left coronary artery).

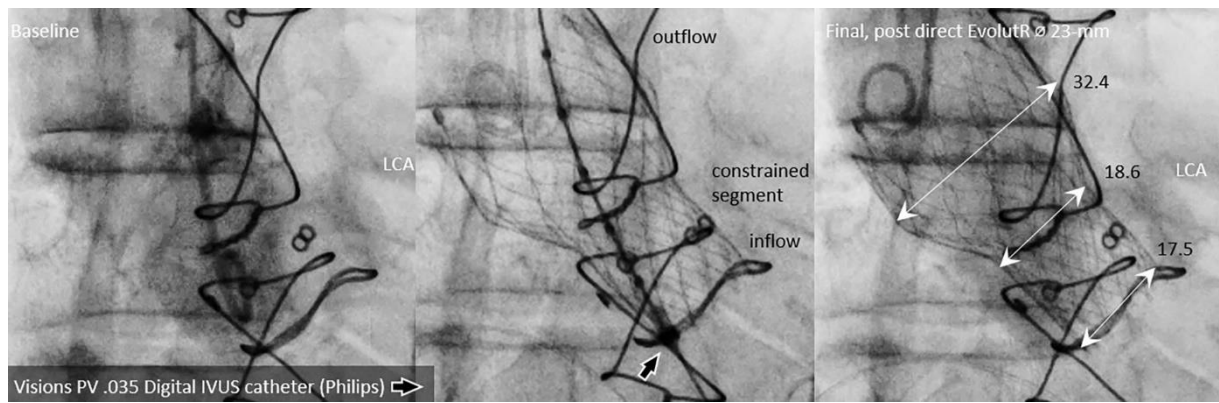


Figure S2. Angiography obtained during TAVR of the failed bioprosthesis (patient #2), with representative THV outer-frame measurements (LCA – left coronary artery).

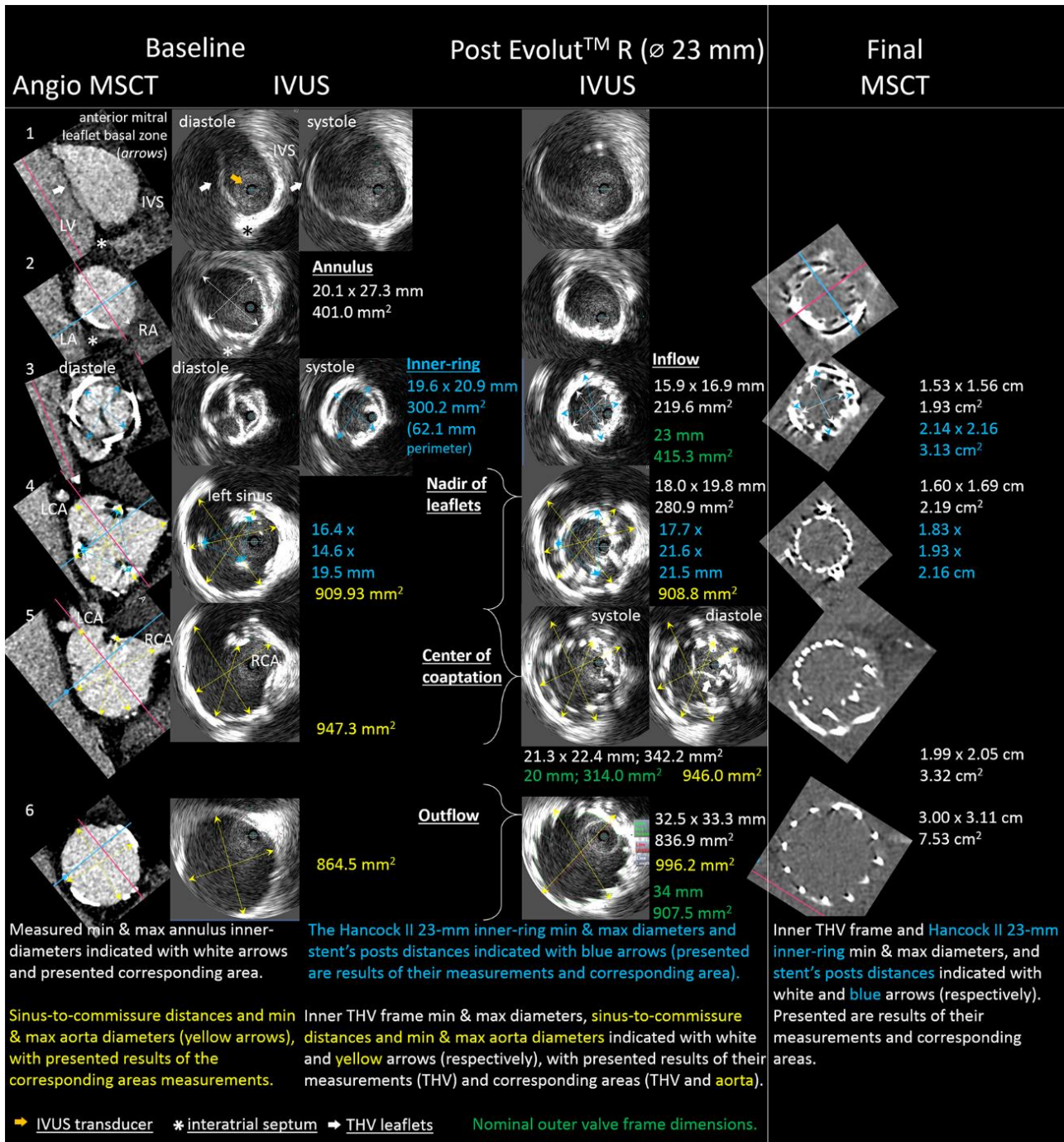


Figure S3. Corresponding MSCT and IVUS images of aortic root anatomy, obtained sequentially at baseline and immediately post-EvolutR ∅23 mm implantation for a treatment of the failed bioprosthesis (Hancock 23mm)(patient #2).

Abbreviations see Figure 1. Unless marked otherwise, MSCT images were obtained in systole.

Baseline MSCT and IVUS images correspond to: left ventricular outflow tract (cross-section 1), aortic annulus (cross-section 2), bioprosthesis inner-ring (cross-section 3), the bioprosthesis stent posts at the level of their upper points (cross-section 4), the level of sinuses with maximum aorta dimension (cross-section 5), and aorta 45mm above the annulus plane (cross-section 6). Procedural IVUS images correspond to: THV inflow; THV constrained segment (with nadir of leaflets and center of coaptation), and THV outflow. Post-procedure MSCT images are shown on the right at levels corresponding to the procedural IVUS images. Baseline MSCT annulus

measurements were 1.98cm (minimum) x 2.34cm (maximum), 8.1cm (perimeter), and 4.11cm² (area). The bioprosthesis inner-ring dimensions were 1.95x2.10cm, 6.20cm, and 3.21cm² (with inner-distances between the bioprosthesis stent posts measured at the level of their upper points of 1.62x1.59x1.85cm). The aorta measurements at the level of the upper points of the stent posts were 3.05x3.54x3.17cm (sinus-to-commissure distances) and 8.30cm²; at the level of the sinuses 3.08x3.48x3.30cm and 8.60cm²; and 45mm above the annulus plane 3.29x3.55cm and 9.50cm² (respectively). Final IVUS inner THV inflow cross-sectional area measurements were 73.2% of baseline inner-ring area (and 56.3% of baseline annulus area); and its expansion was of 53% of that predicted from the manufacturer's chart (with its maximal diameter being 73.5% of that predicted). IVUS inner THV frame dimensions at the nadir of leaflets were of 89.5% of nominal, but at the level of center of coaptation were 109% of that predicted from the manufacturer's chart (with its minimal diameter being larger than the predicted). THV outflow dimension measured by IVUS was 11% smaller than predicted.