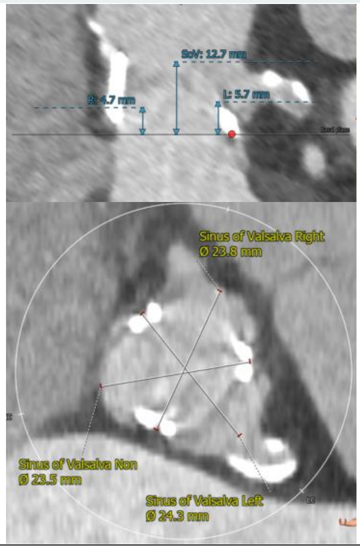
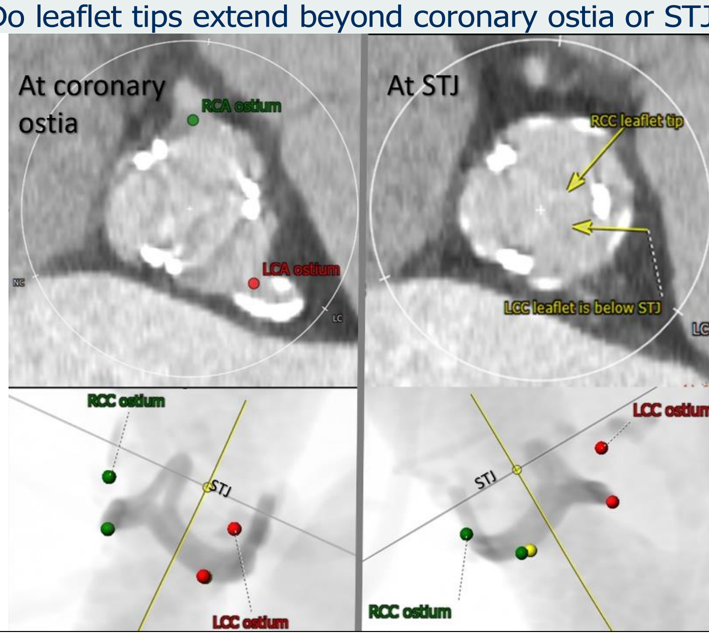
Data Supplement: Preventing coronary obstruction during TAVR: From CT to BASILICA

Supplemental Figure 1. Aortic root dimensions



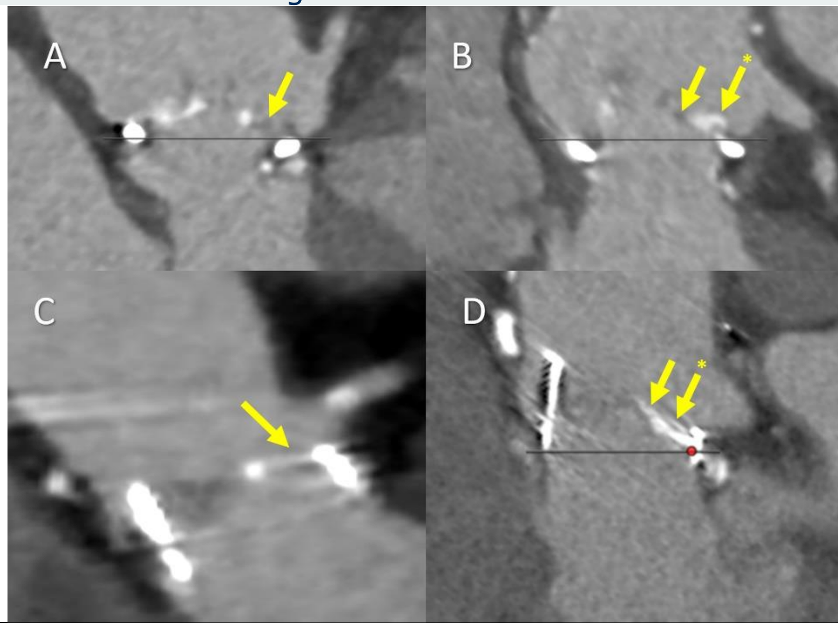
Coronary artery height (top) by convention is measured to the base of the artery, but a second measurement to the top of the coronary artery may be useful. The Sinus of Valsalva widths (bottom) are measured as usual.

Supplemental Figure 2. Do leaflet tips extend beyond coronary ostia or STJ?



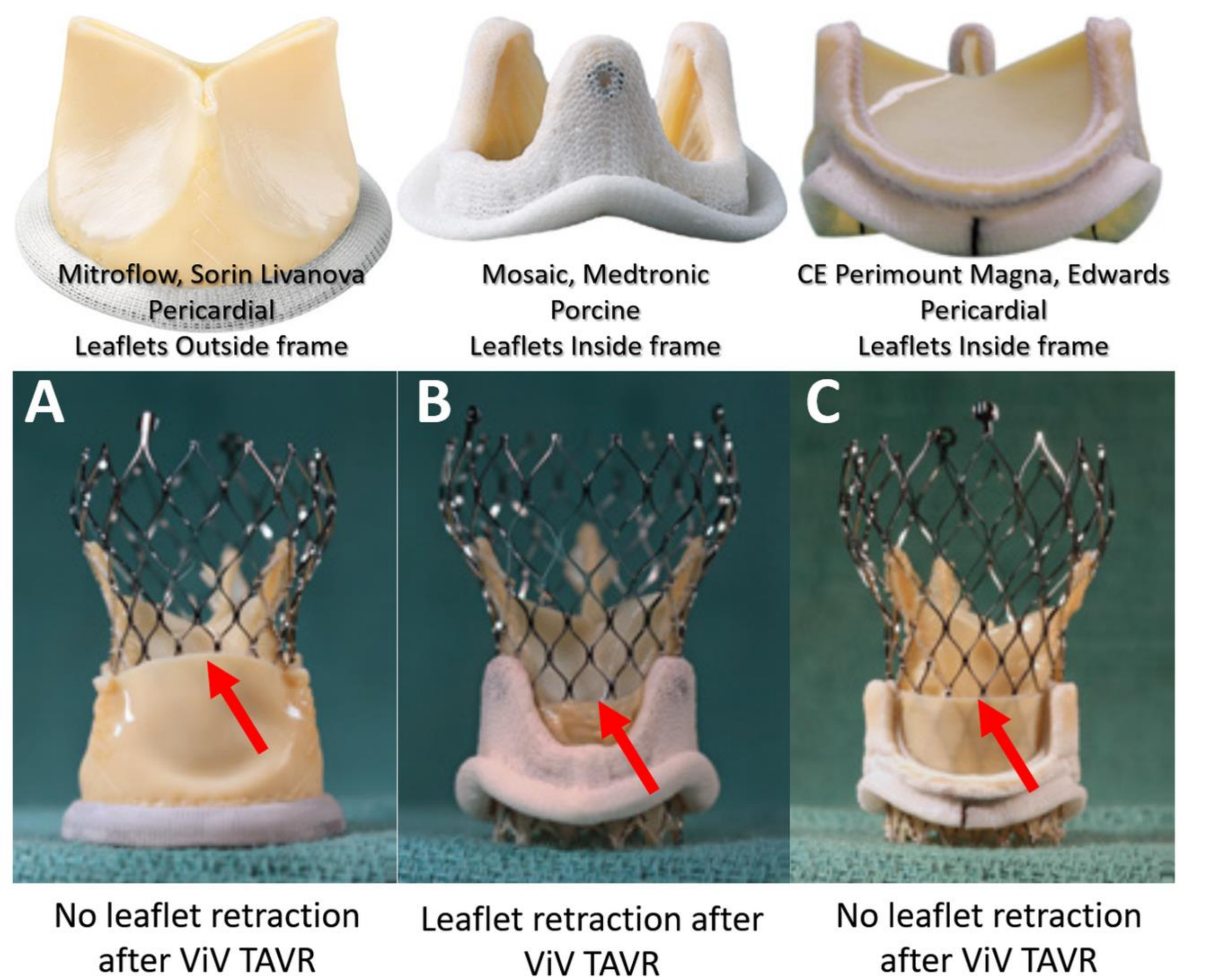
Relationship of leaflets and bioprosthetic stent posts to the coronary ostia and sinotubular junction (STJ).

Supplemental Figure 3. Patterns of target leaflet calcification



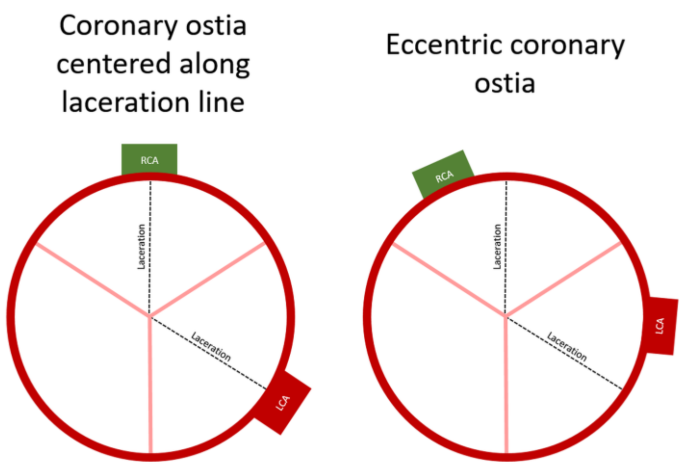
A: Typical heterogeneous calcification in a Mitroflow easily traversed. B: Heavy calcification at the base of a Mitroflow not successfully traversed (*) alongside a more distal target successful traversed. C: Target successfully traversed through eggshell calcification (confounded by blooming artifact) at the base of a MAGNA valve. D: Confluent calcification at the base of a MAGNA valve that was not crossed (*), alongside thinner coalification that was successfully traversed.

Supplemental Figure 4. SAVR features that may confound BASILICA



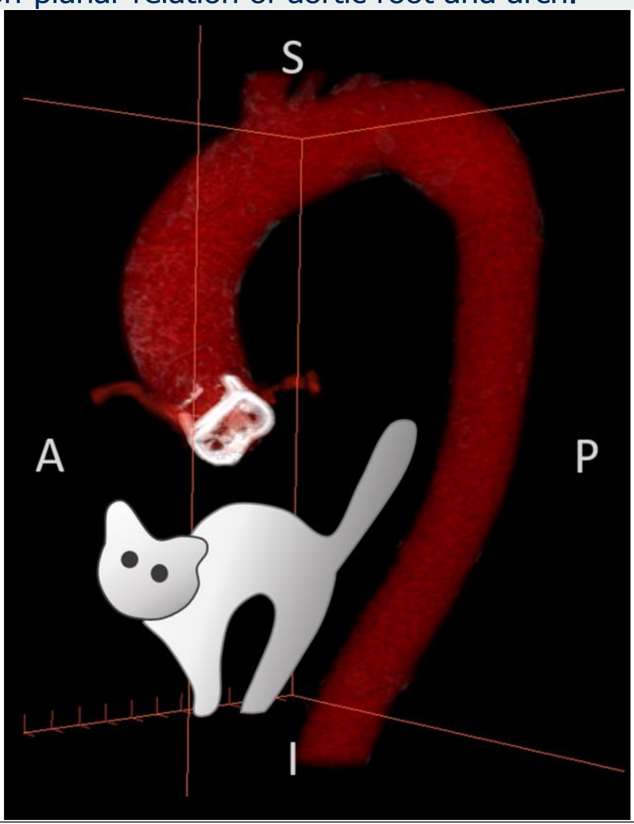
A: Mitroflow valve has pericardial leaflets mounted external to the frame, more likely to encroach on coronaries, and leaflets tend not to retract (arrow) after TAVR. B: Mosaic porcine leaflets tend to retract (arrow) after TAVR. C: Perimount MAGNA pericardial leaflets are mounted internal to the valve frame and tend not to retract (arrow) after TAVR. Photographs from [Bapat V and colleagues, Catheter Cardiovasc Interv 2013;81:853-61], with permission, and courtesy of Medtronic, LivaNova PLC, and Edwards Lifesciences LLC.

Supplemental Figure 5. Anatomic confounders to BASILICA.



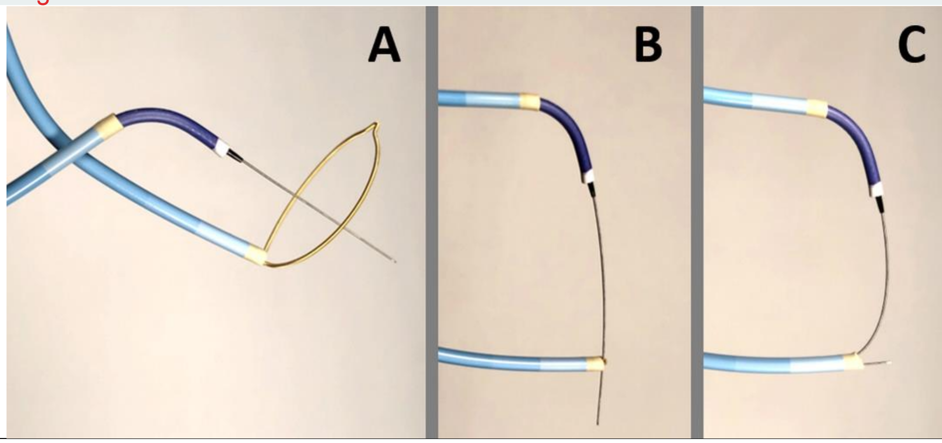
Left: If the coronary artery ostia are oriented along leaflet midlines, lacerations automatically correspond to them. Right: eccentric coronary ostia are not aligned with leaflet midlines. Midline lacerations afford inadequate protection if there is a deficient Sinus of Valsalva (VTC close to zero).

Supplemental Figure 6. Non-planar relation of aortic root and arch.



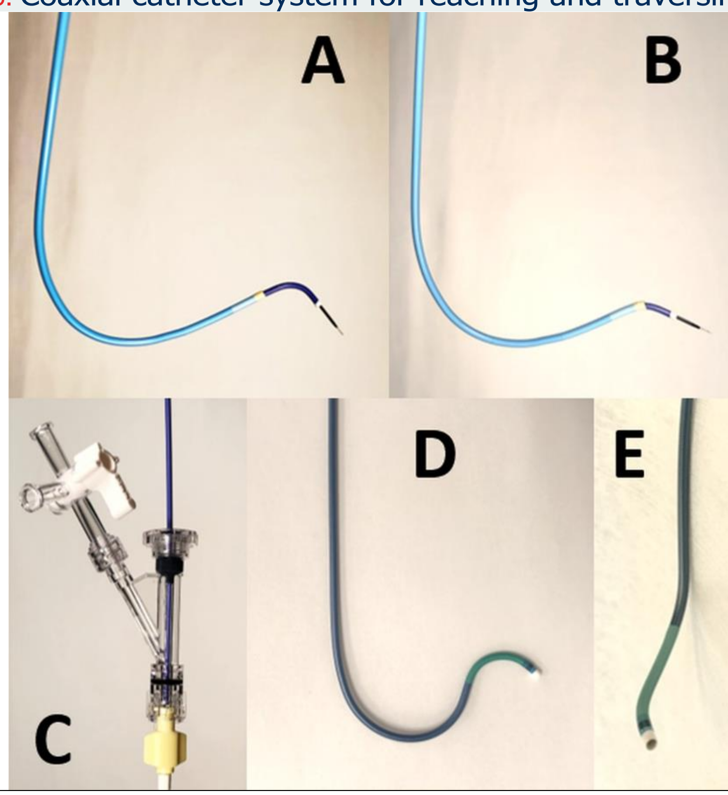
The aortic root lies in a different plane from the aortic arch, both anterior and leftward. A "cat looking left" models the geometry. This informs the required catheter paths and geometry for BASILICA.

Supplemental Figure 7. Traversal and Snare Catheters.



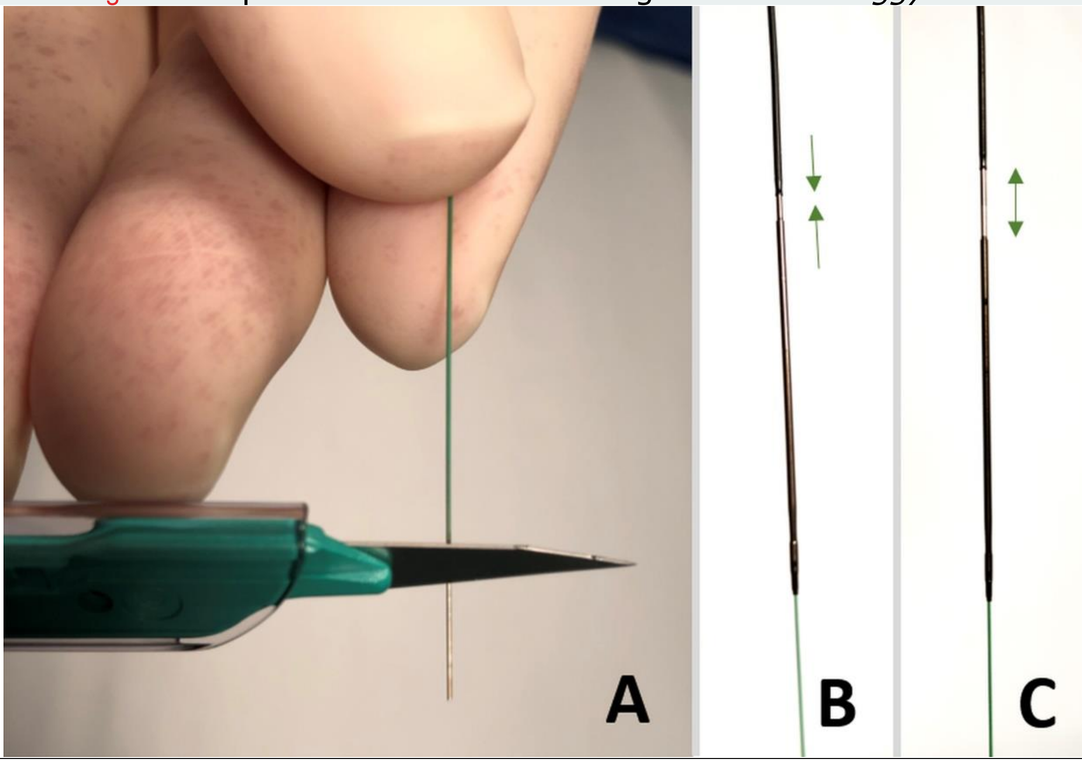
Benchtop demonstration of a coaxial crossing catheter system positioned in the aortic root and aimed towards a snare pre-positioned in the LVOT (A). After the traversal guidewire is grasped (B) it is invaginated in the snare catheter (C).

Supplemental Figure 8. Coaxial catheter system for reaching and traversing left coronary cusp.



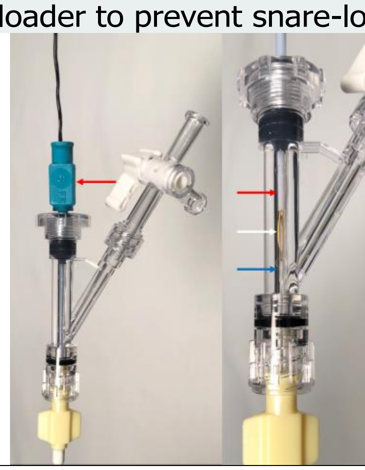
A, B: Extra backup left guide (6-8Fr) delivering long internal mammary diagnostic catheter (125cm x 5Fr). The rotational orientation of the two is secured with a rotating hemostatic valve (C). The mammary catheter can be retracted (B) or extended (A) to achieve the desired position. The Piggyback and Astato-XS guidewire are delivered through these. New “pachyderm” left (D) and right (E) guide catheter shapes, designed based on principles elucidated in this paper, may obviate coaxial IM catheters-in-guides.

Supplemental Figure 9. Preparation of the *AstatoXS20* guidewire and *Piggyback* microcatheter.



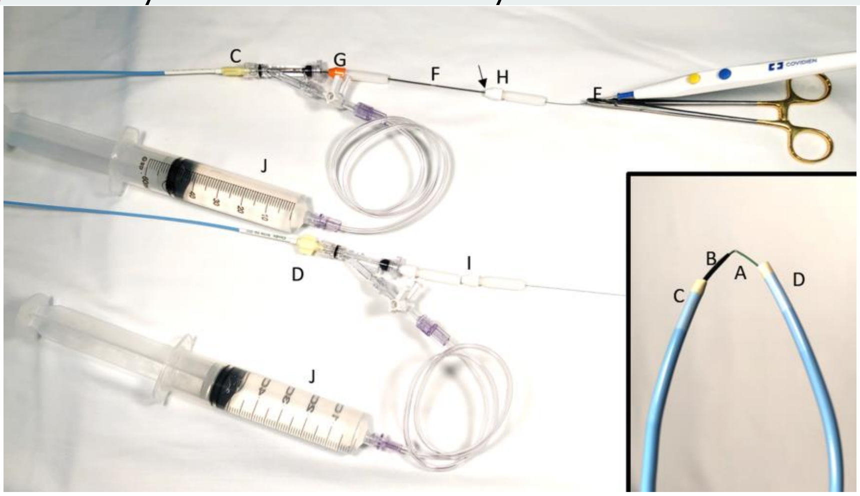
(A) The back end of the Astato XS guidewire is scraped with a scalpel to remove the insulating coating and assure a good electrical connection to the electrosurgical pencil. The hub-less Piggyback Wire Convertor microcatheter is locked (B) by compressing inwards and un-locked by pulling outwards.

Supplemental Figure 10. Using the loader to prevent snare-loss of traversal guidewire.



Left: The loader (red arrow) occupies lumen space in the Tuohy-Borst rotating hemostatic valve and catheter hub. This constrains the snare (white arrow) and prevents the ensnared guidewire (blue arrow) from slipping out.

Supplemental Figure 11. Fully-assembled laceration system.



The flying-V (inset) consists of the (A) kinked Astato shaft with its inner surface denuded of insulation, the Piggyback (B) extending through the traversal catheter (C) within millimeters of the laceration surface, and the traversal (C) and LVOT (D) guiding catheters positioned close to the laceration surface on either side of the leaflet. Outside the body, the back-end of the Astato wire (E) is denuded and clamped to an electrosurgical pencil with a needle driver. The Piggyback is locked (F), a 0.035" torque device (G) is loaded over it to secure it against the rotating hemostatic valve, and a 0.014" torque device is clamped over the Astato tightly abutting the back end of the Piggyback (arrow). A pair of 0.014" torque devices are loaded and tightened on the free Astato withdrawn through the LVOT catheter (I) also to provide traction. Two 60mL syringes (J) are loaded with non-ionic and isotonic dextrose solution. Take care to aspirate and discard clot or blood from both guiding catheters before injecting, and take care to prevent blood reflux that contaminates the flush with electrolytes.