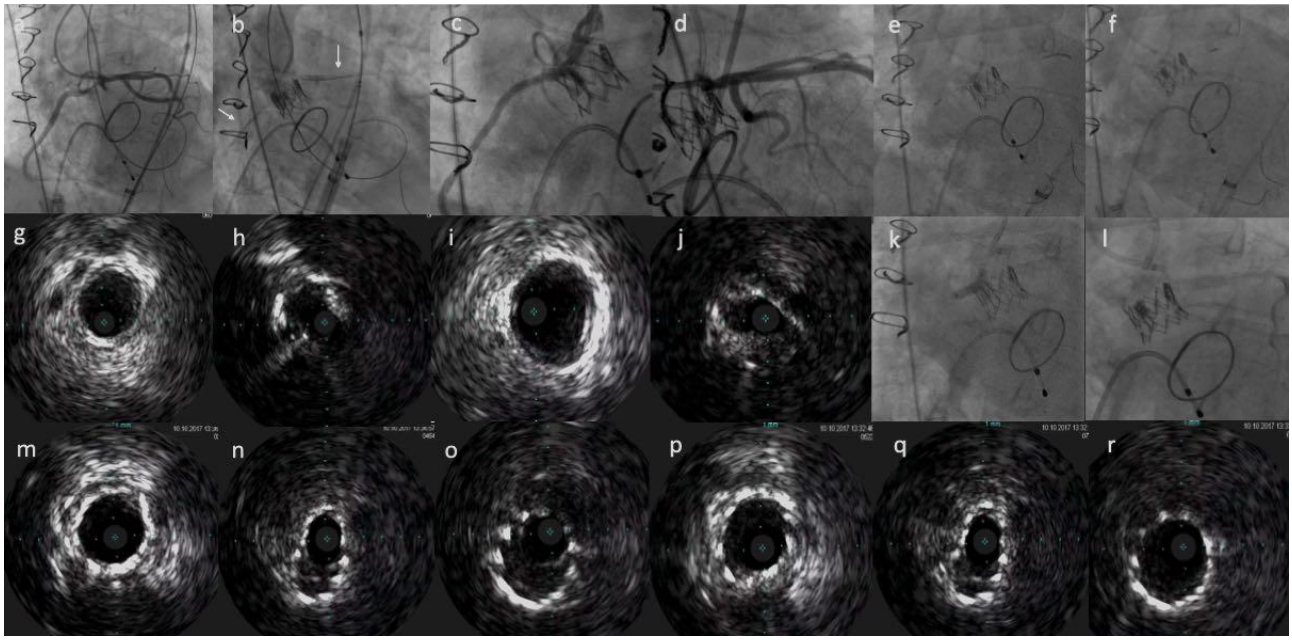
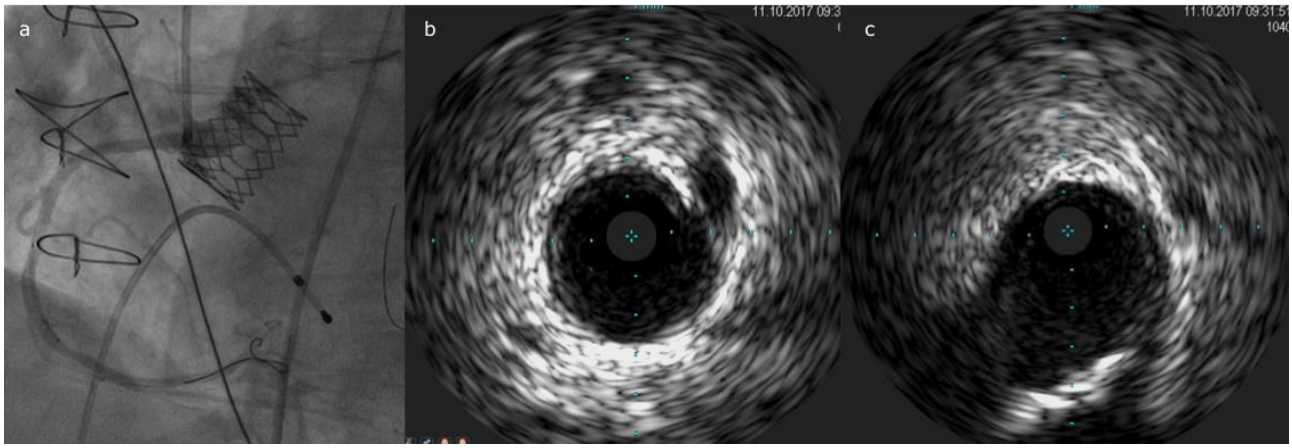
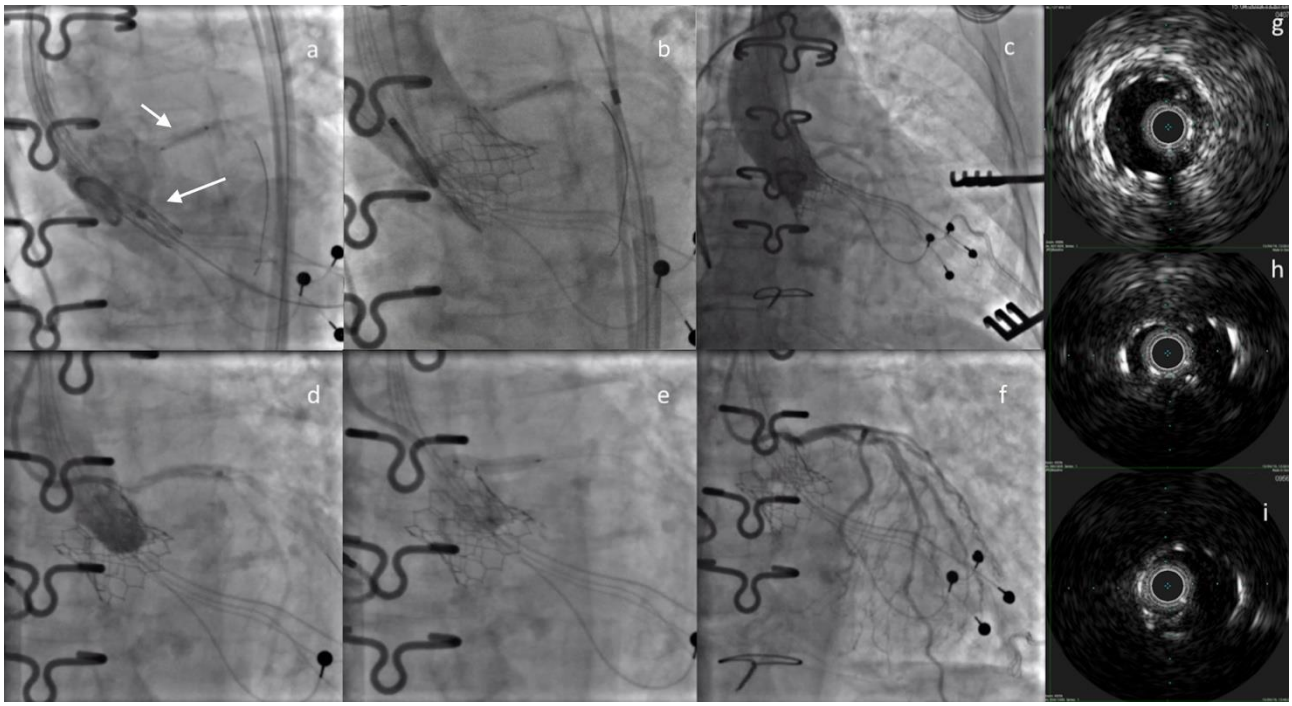
Supplementary data



Supplementary Figure 1. IVUS assessment of coronary ostia after VIV-TAVI.
a) Simultaneous opacification of the right and left coronary arteries showing the low origin of the two ostia.
b) Expanded SAPIEN XT 20 mm valve (Edwards Lifesciences, Irvine, CA, USA), guidewires and undeployed stents in the right and left coronary arteries (arrows).
c) Right coronary angiography showing normal flow.
d) Left coronary angiography showing normal flow.
e) & f) IVUS catheter in the right and subsequently in the left coronary arteries after removal of the undeployed stents.
g) IVUS images of the proximal segment of the RCA.
h) IVUS at the ostium of the RCA that shows a clear footprint by the surgical valve leaflet.
i) IVUS images of the proximal segment of the left main and its ostium that shows a clear footprint by the surgical valve leaflet (j).
Stenting of the right (k) and left coronary artery (l).
m) IVUS of the RCA at the proximal segment.
n) The ostium compressed by the SAPIEN XT valve metallic struts.
o) The edge protruding into the aorta.
p) IVUS images of the left main at the shaft.
q) The ostium compressed by the SAPIEN XT valve metallic struts.
r) The edge protruding into the aorta.



Supplementary Figure 2. Case example of IVUS confirmation of patent coronary ostium after VIV-TAVI.
a) Unselective right coronary angiography, showing normal coronary flow.
b) IVUS image of proximal segment of right coronary showing full vessel patency.
c) IVUS image of right coronary ostium without signs of degenerated leaflet footprint on it, suggesting safe removal of the protective wire and avoidance of stent implantation.



Supplementary Figure 3. Case example of CAO despite normal coronary angiogram after non-IVUS-guided VIV-TAVI**.**

In this patient, not assessed by IVUS after valve implantation, left coronary occlusion and shock occurred after wire retrieval despite an apparently normal flow at the angiogram and haemodynamic stability following the successful valve implantation (Edwards S3, 23 mm). Immediate left main recanalisation after re-wiring allowed flow restoration and haemodynamic recovery after emergency stenting.

a) The undeployed balloon-expandable aortic valve and one undeployed stent in the left coronary artery (arrows).

b) After deployment of the valve, the left coronary artery is patent and haemodynamics are stable but with the wire and the undeployed stent still in place.

c) Left coronary occlusion and sudden shock after the retrieval of the wire and the stent managed by the emergency percutaneous implantation of an extracorporeal membrane oxygenator.

d) Re-wiring of the left coronary artery.

e) Emergency stent implantation in the left coronary ostium.

f) Final angiographic image with normal patency of the left coronary system and rapid haemodynamic recovery.

g) IVUS images of the stent in the left main shaft.

h) The ostium compressed at the level of the aortic valve metallic frames.

i) Protrusion into the coronary sinus.

Supplementary Table 1. Demographic characteristics of VIV patients.

Clinical characteristics	**VIV patients (50)**
Age, years	78 [6]
Logistic EuroSCORE, %	25.3±8.7
EuroSCORE II, %	10 [3]
STS score, %	4 [3]
Male, n (%)	25 (50%)
BMI, kg/m^2	26.6±6.5
GFR <30 mL/min, n (%)	36 (72%)
Anaemia*, n (%)	30 (60%)
Dyslipidaemia, n (%)	28 (56%)
COPD, n (%)	6 (12%)
Diabetes, n (%)	13 (26%)
Hypertension, n (%)	38 (50%)
Previous AMI, n (%)	5 (10%)
Atrial fibrillation, n (%)	23 (46%)
Previous stroke, n (%)	6 (12%)
PVD, n (%)	16 (32%)
CAD, n (%)	33 (66%)
Previous CABG, n (%)	17 (34%)
NYHA Class III or IV, n (%)	50 (100%)
Pure aortic valve stenosis, n (%)	15 (30%)
Pure aortic valve insufficiency, n (%)	14 (28%)
Mixed steno-insufficient valve, n (%)	21 (42%)
Valve type	
Stented with leaflets mounted internally	
Medtronic Hancock, n (%)	18 (36%)
Edwards Perimount, n (%)	10 (20%)
SJM Biocor, n (%)	1 (2%)
Stented with leaflets mounted externally	
SJM Trifecta, n (%)	1 (2%)
Sorin Mitroflow, n (%)	4 (8%)
Stentless	
SJM Toronto, n (%)	2 (4%)
Sorin Pericarbon Freedom, n (%)	3 (6%)
Sorin Freedom SOLO, n (%)	7 (14%)
Bravo 400 stentless xenograft, n (%)	2 (4%)
Edwards Prima Plus, n (%)	2 (4%)

Categorical data are presented as numbers and percentages; continuous data are presented as means±standard deviations for normally distributed variables and as median (interquartile range) otherwise.

*Anaemia: <13 g/dL for males, <12 g/dL for females.

AMI: acute myocardial infarction; BMI: body mass index; CABG: coronary artery bypass graft; CAD: coronary artery disease; COPD: chronic obstructive pulmonary disease; GFR: glomerular

filtration rate; NYHA: New York Heart Association; PVD: peripheral vascular disease; STS: Society of Thoracic Surgeons

Supplementary Table 2. Detailed risk factors of coronary occlusion in patients presenting high risk for CAO.

Patient n.	Low-lying coronary ostia: LM/RCA	Narrow Valsalva sinuses	VTC <4 mm: LM/RCA	Unfavourable surgical prosthesis*	LM occlusion risk	RCA occlusion risk
1	+/+	+	- / -	+	+	+
2	+/ -	-	+/-	+	+	-
3	+/+	+	-/-	+	+	+
4	+/+	+	+/+	+	+	+
5	+/+	+	+/+	+	+	+
6	+/+	+	- / -	+	+	+
7	+/ -	-	+/ -	+	+	-
8	+/ -	-	- / -	+	+	-
9	+/ -	-	+/ -	+	+	-
10	+/+	+	- /+	+	+	+

LM: left main; RCA: right coronary artery; VTC: virtual transcatheter valve to coronary
* stentless or stented valve with externally mounted leaflets.
+ presence of the risk factor.
- absence of the risk factor.

Supplementary Table 3. Coronary protection strategies adopted for each high-risk patient.

Patient n.	Coronary	Protection wire + undeployed stent	IVUS assessment	BASILICA	Other strategies	Stent number
1	LM	+	-	-	Bail-out chimney for CA after VIV	1
	RCA	+	-	-	Bail-out chimney for CA after VIV	1
2	LM	+	-	-	Bail-out chimney for CA after VIV	2
	RCA	+	-	-	Bail-out chimney for CA after VIV	1
3	LM	+	-	-	Bail-out chimney for CA **after wire removal**	1
	RCA	-	-	-	-	0
4	LM	+	+	-	-	1
	RCA	+	+	-	-	1
5	LM	+	+	-	-	1
	RCA	+	+	-	-	0
6	LM	+	+	-	-	0
	RCA	+	+	-	-	0
7	LM	+	+	-	-	0
	RCA	-	-	-	-	0
8	LM	-	+	+	-	0
	RCA	-	-	-	-	0
9	LM	-	+	+	-	1
	RCA	-	-	-	-	0
10	LM	-	+	+	-	0
	RCA	+	+	-	-	1

CA: cardiac arrest; LM: left main; RCA: right coronary artery

Moving image 1. Approach to the case reported in Supplementary Figure 1.

A) IVUS pullback from LAD to LM and aorta. At the end of the run, the occlusion of the LM is evident.

B) IVUS pullback from LAD to LM and aorta after stenting. Note the good expansion in the distal third of the stent, the compressed (elliptic) shape of the stent at the level of the ostium, and the round shape of the proximal segment of the stent protruding into the aorta.

Moving image 2. Approach to the case reported in Supplementary Figure 2.

IVUS evaluation after transcatheter valve deployment, showing fully patent right coronary artery ostia. Note the absence of signs of the surgical degenerated leaflet at the ostium.