How Do We Choose One Valve over The Other ?

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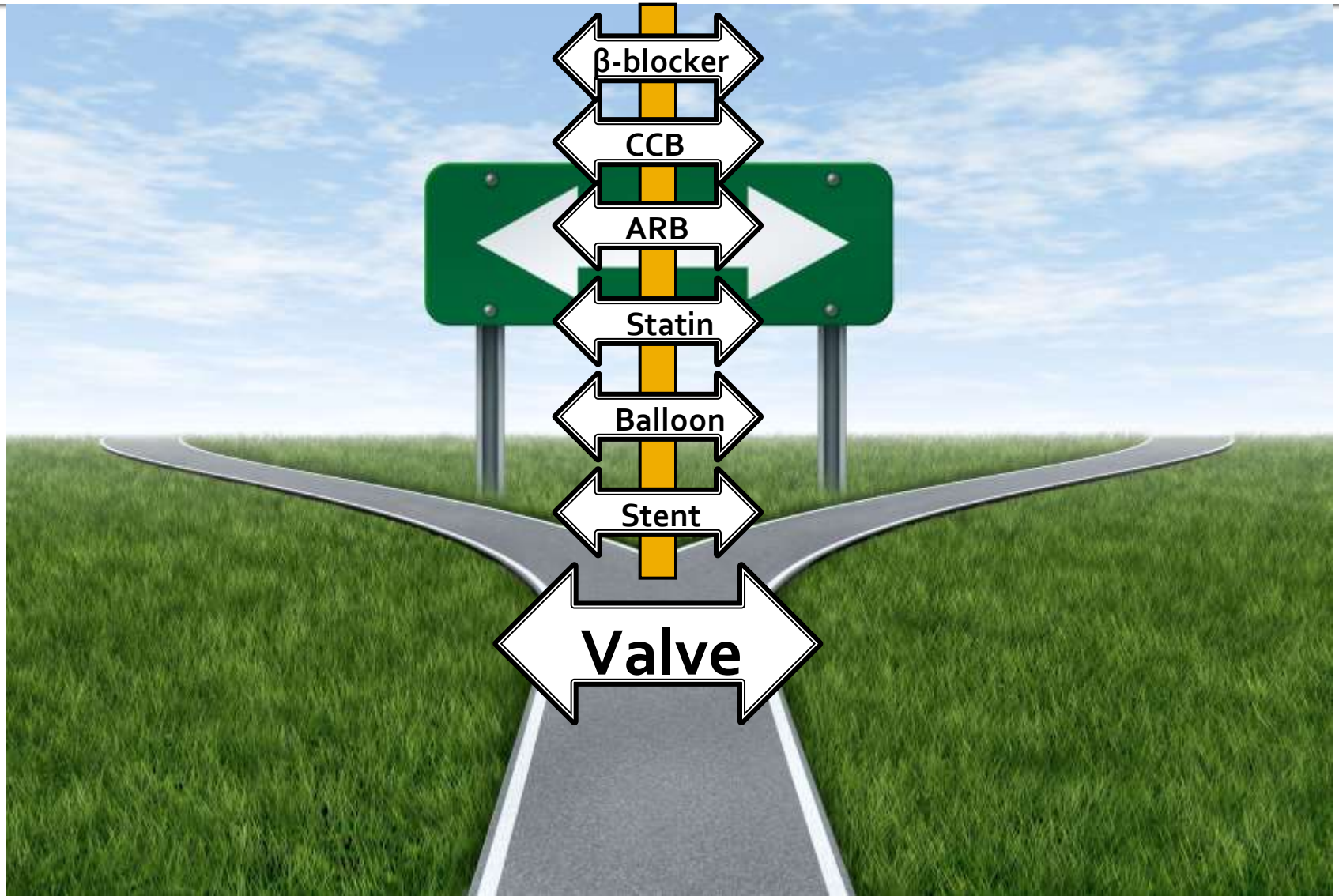
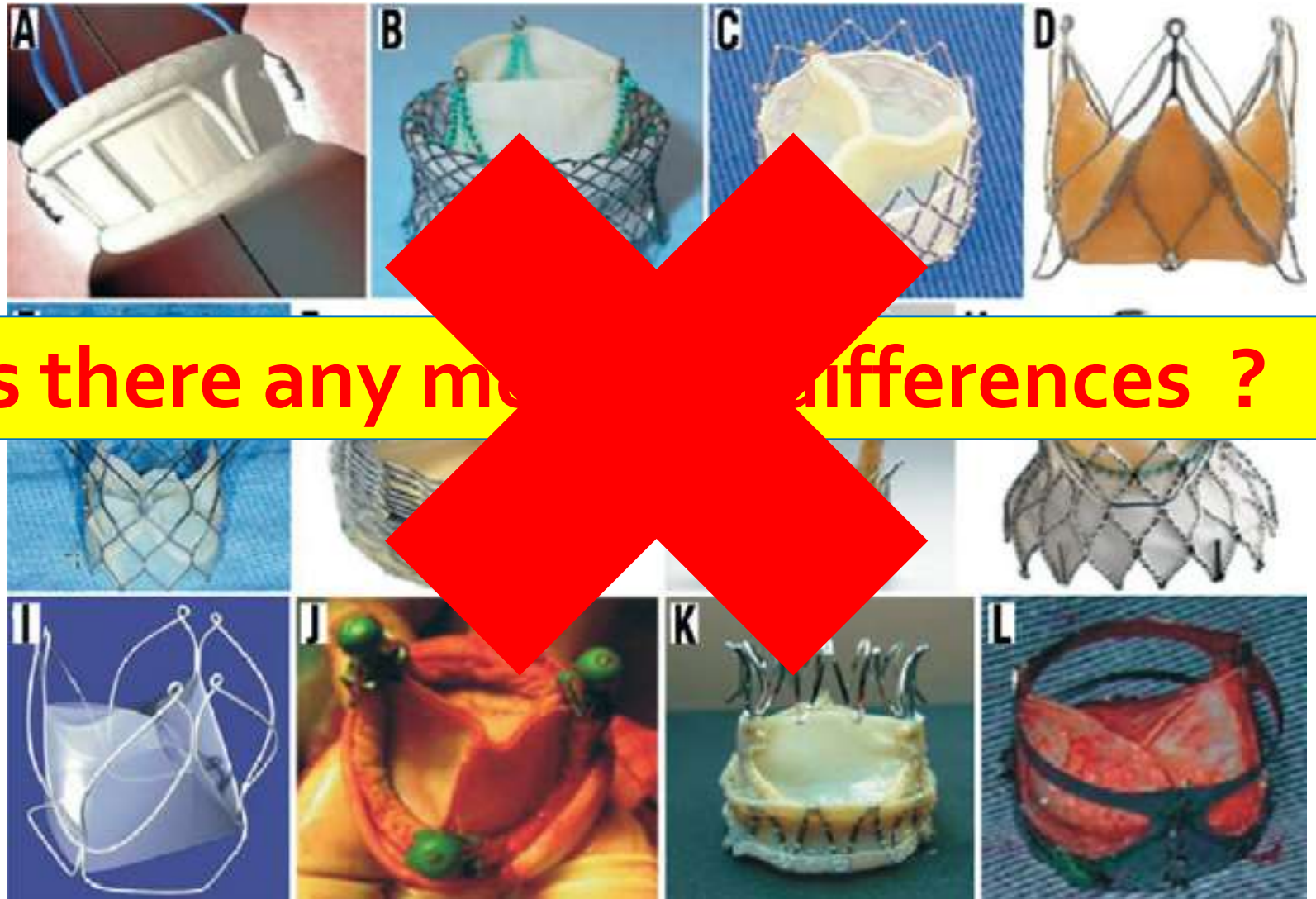
A cardiologist's daily life:
Making choice of drug, balloon, stent



Beauty Contest in Asia Country

Is there any meaning differences ?

TAVR Devices in The World



Is there any m ifferences ?

TAVR Devices in Taiwan

2010: First CoreValve implantation in Taiwan at **NTUH**.

Dec 2012: **CoreValve** approved by MOHW.

Aug, 2015: **Sapien XT** Approved by MOHW

Dec, 2015: **Evolute R** approved by MOHW

2010: First Sapien implantation in Taiwan at **VGH-TPE**

Dec 2012: **Lotus Valve** approved by MOHW, and implanted in **CHGH & NTUH**

Jan, 2017: **Portico Valve** approved by MOHW and implanted in **NTUH**

Devices Experiences in Taiwan

Sapien XT (Edwards)

CoreValve (Medtronic)

Lotus (Boston)

Portico (Abbott)

Basic Differences

	Expanding mechanism	Metallic frame	Leaflet tissue	Retrievable	Repositionable
CoreValve	Self - expanding	Nitinol	Porcine	Yes	Partial
Sapien XT	Balloon-expanding	Cobalt-chromium	Bovine	No	No
Lotus	Mechanical -expanding	Braided Nitinol	Bovine	Yes	Complete
Portico	Self - expanding	Nitinol	Bovin& Procine	Yes	Partial

Basic Differences

	Size (mm)	Treatable annulus diameter (mm)	Frame height (mm)	Sheath Size (Fr)
CoreValve	23/26/29/31	18-29	45/55/53/52	18
Sapien XT	20/23/26/29	16-27	14/14/17/19	16/16/18/20
Lotus	23/25/27	20-27	19	18,20
Portico	23/25/27/29	19-27	50/53/49/50	18

Choice of TAVR Devices

- 70% of AS patients: could adapt to all kinds of TAVR devices
- Specific individuals:
  - ✓ **Bicuspid aortic valve**
  - ✓ **Low LVEF, low gradient aortic stenosis**
  - ✓ **Low coronary takeoff & small annulus**
  - ✓ **Tortuous & atheromatic aorta**
  - ✓ **Heavily calcified aortic valve**

Bicuspid Aortic Valve (BAV)

J Am Coll Cardiol. 2017 Mar 15. pii: S0735-1097(17)36041-2. doi: 10.1016/j.jacc.2017.03.017. [Epub ahead of print]

Procedural and Clinical Outcomes in Transcatheter Aortic Valve Replacement for Bicuspid Versus Tricuspid Aortic Valve Stenosis.

Yoon SH[1], Bleiziffer S[2], De Backer O[3], Delgado V[4], Arai T[5], Ziegelmueller J[2], Barbanti M[6], Sharma R[7], Perlman GY[8], Khalique OK[9], Holy EW[10], Saraf S[11], Deuschl F[12], Fujita B[13], Ruile P[14], Neumann FJ[14], Pache G[15], Takahashi M[16], Kaneko H[17], Schmidt T[18], Ohno Y[8], Schofer N[12], Kong WK[19], Tay E[20], Sugiyama D[21], Kawamori H[7], Maeno Y[7], Abramowitz Y[7], Chakravarty T[7], Nakamura M[7], Kuwata S[22], Yong G[23], Kao HL[24], Lee M[25], Kim HS[26], Modine T[27], Wong SC[28], Bedogni F[29], Testa L[29], Teiger E[16], Butter C[17], Ensminger SM[13], Schaefer U[12], Dvir D[8], Blanke P[8], Leipsic J[8], Nietlispach F[22], Abdel-Wahab M[10], Chevalier B[5], Tamburino C[6], Hildick-Smith D[11], Whisenant BK[30], Park SJ[31], Colombo A[32], Latib A[32], Kodali SK[9], Bax JJ[4], Søndergaard L[3], Webb JG[5], Lefèvre T[5], Leon MB[9], Makkar R[7].

⊕ **Author information**

Abstract

BACKGROUND: Transcatheter aortic valve replacement (TAVR) in patients with bicuspid aortic valve stenosis (AS) is being increasingly performed.

OBJECTIVES: From the Bicuspid AS TAVR multicenter registry, the procedural and clinical outcomes in patients with bicuspid versus tricuspid AS were compared.

METHODS: Outcomes of 561 patients with bicuspid AS and 4,546 patients with tricuspid AS were compared after propensity-score matching assembling 546 pairs of patients with similar baseline characteristics. Procedural and clinical outcomes were recorded acc

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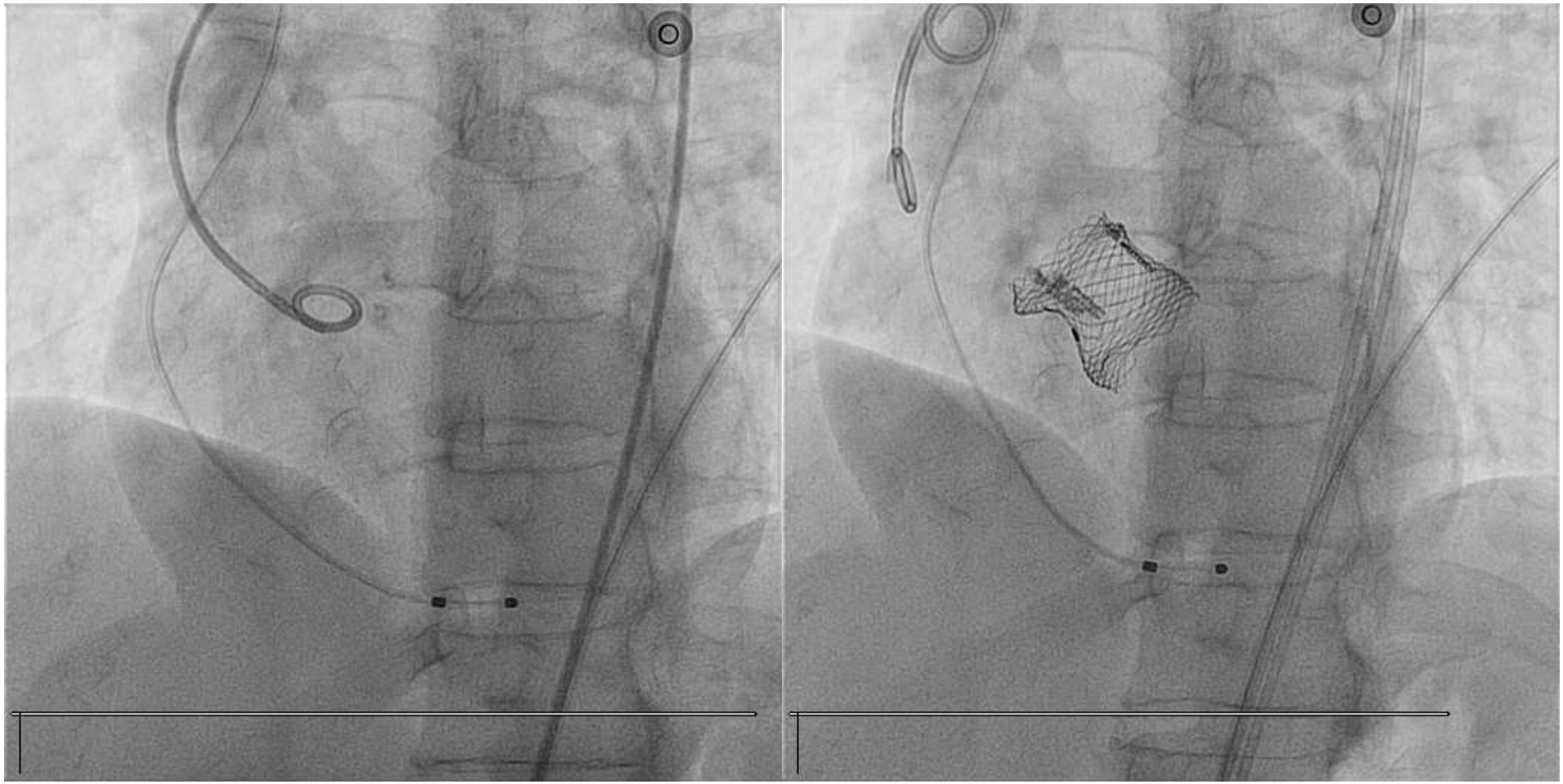
Within the group receiving early generation devices, bicuspid AS had more frequent **aortic root injury** (4.5% vs. 0.0%; p=0.015) when receiving the **Sapien XT**, and **moderate-to-severe paravalvular leak** (19.4% vs. 10.5%; p=0.02) when receiving the **CoreValve**.

Lotus Valve for BAV



Choice of TAVR Devices

	CoreValve	Sapien XT	Lotus	Portico
				
Bicuspid Valve	✓	✓	✓ ✓	?

Low EF, low gradient aortic stenosis

CoreValve

- ✔ *Small profile*
- ✖ *Longer instability transition as compared to Lotus*

Lotus

- ✖ *Larger profile*
- ✖ *Unpredictable procedure time if device twist*
- ✔ *Valve starts to function early - no instability*

Sapien XT

- ✔ *Quick procedure*
- ✖ *> 10 seconds rapid pacing*

Portico

- ✔ *Small profile*
- ✔ *Valve starts to function early - no instability*

Choice of TAVR Devices

	CoreValve 	Sapien XT 	Lotus 	Portico 
Bicuspid Valve	✓	✓	✓ ✓	?
Low EF, low gradient AS	✓	✓	✓	✓ ✓

Coronary Obstruction

CLINICAL RESEARCH Interventional Cardiology

Predictive Factors, Management, and Clinical Outcomes of Coronary Obstruction Following Transcatheter Aortic Valve Implantation

Insights From a Large Multicenter Registry

- The **mean left coronary artery ostia height** (10.62.1 mm vs. 13.42.1mm,p< 0.001) were **lower** and **sinus of Valsalva diameters** (28.1± 3.8 mmvs. 31.9± 4.1 mm, p< 0.001) were **smaller** in patients with obstruction than in control subjects.

J Am Coll Cardiol. 2013 Oct 22;62(17):1552-62.

Predictive Factors, Management, and Clinical Outcomes of Coronary Obstruction Following Transcatheter Aortic Valve Implantation

Insights From a Large Multicenter Registry

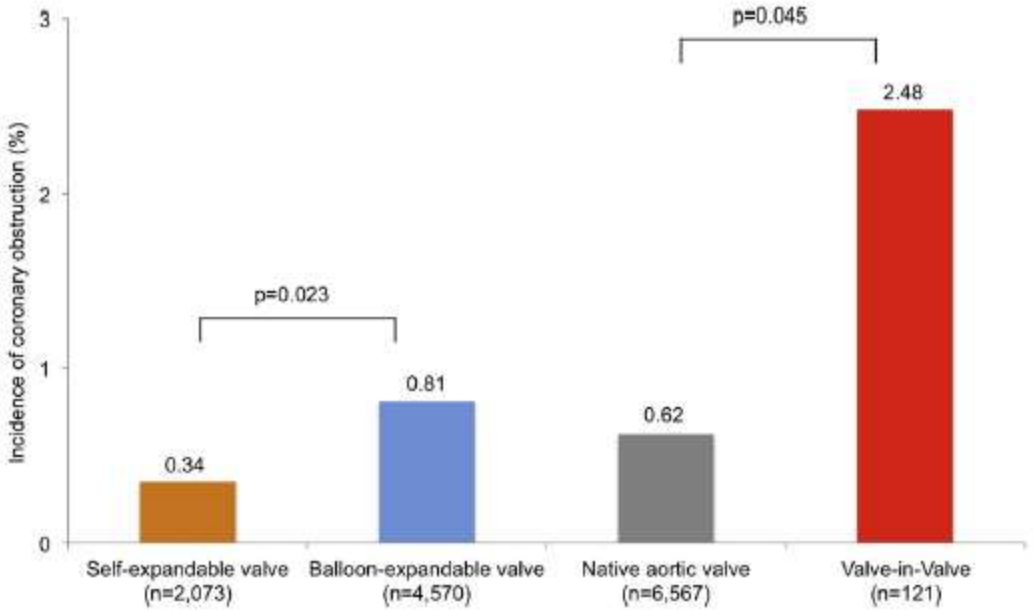
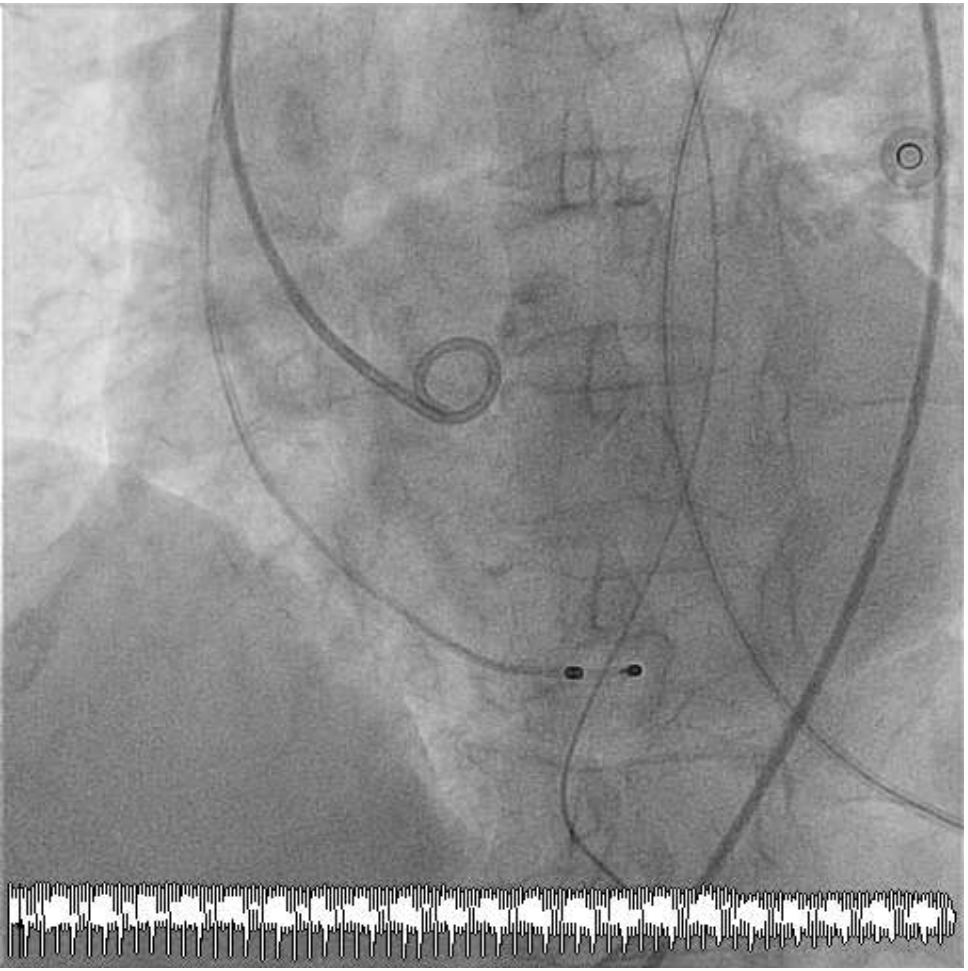


Figure 2 **Incidence of Coronary Obstruction According to Valve Type and Valve-In-Valve Procedures**

Incidence of coronary obstruction following transcatheter aortic valve implantation with self-expandable or balloon-expandable valves, as well as in native or prosthetic aortic valves.

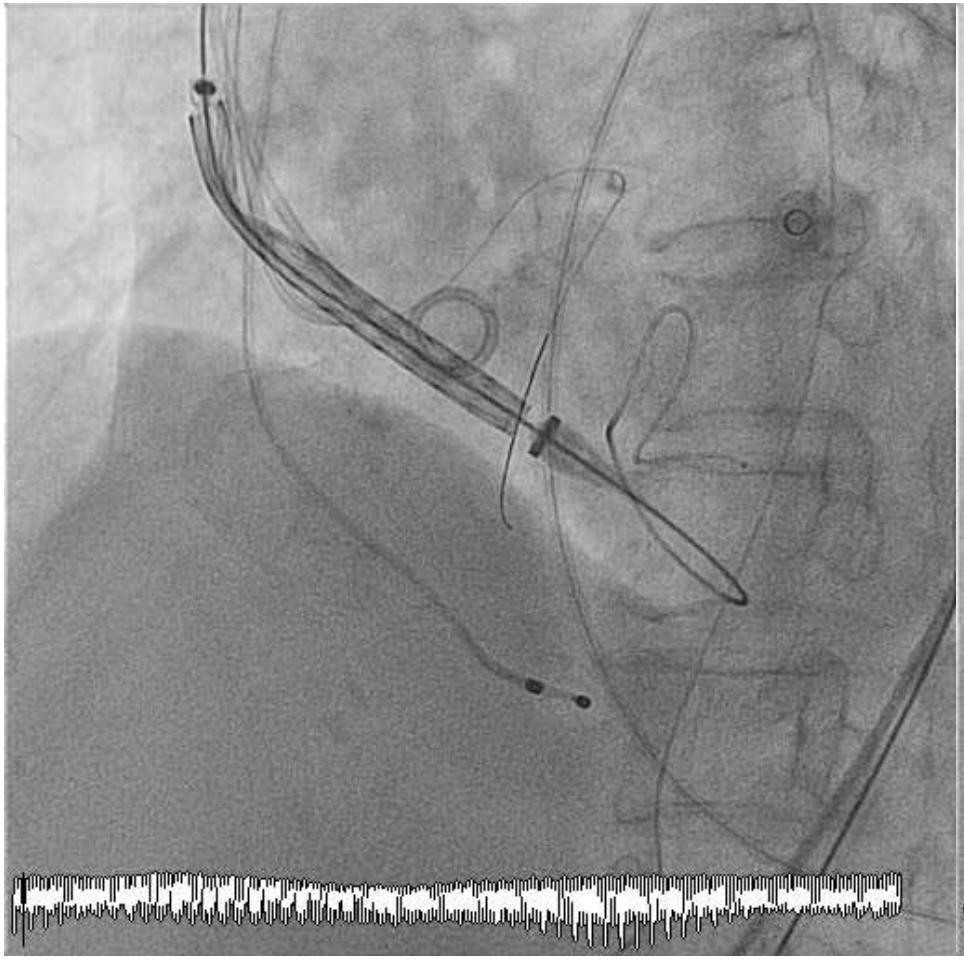
J Am Coll Cardiol. 2013 Oct 22;62(17):1552-62.

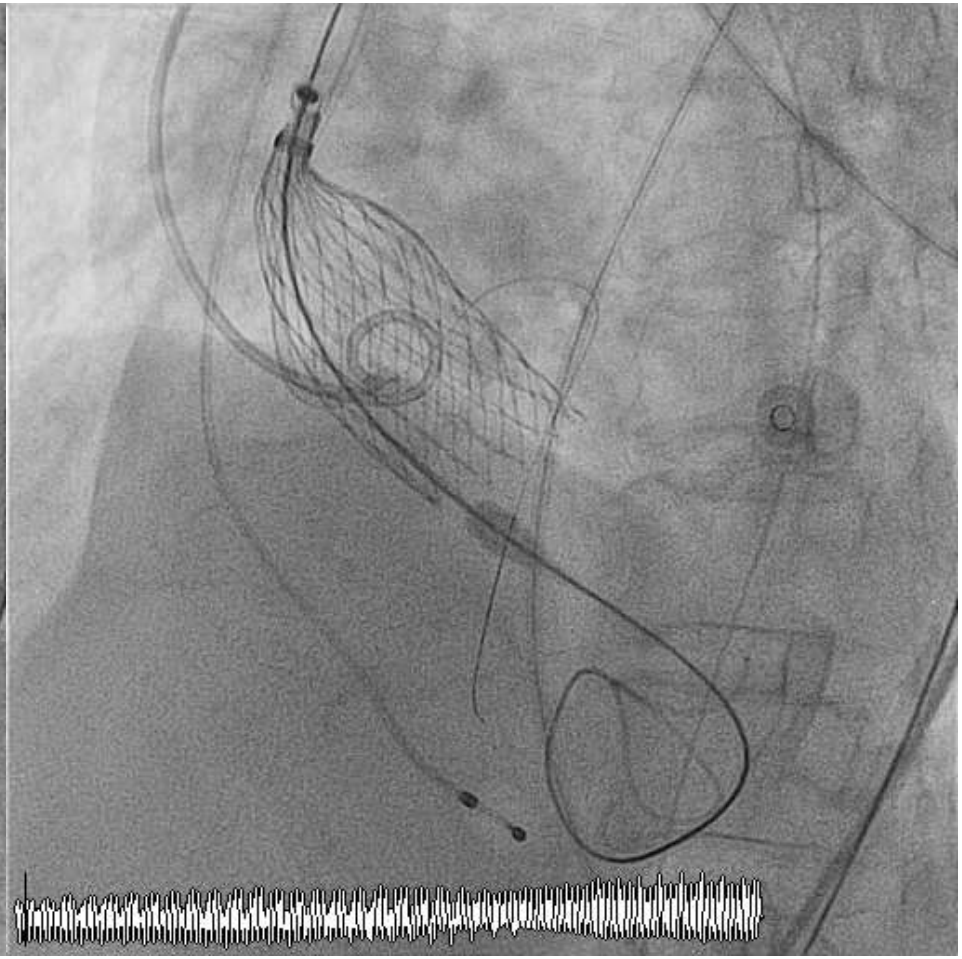
Low Coronary Height & Small Annulus



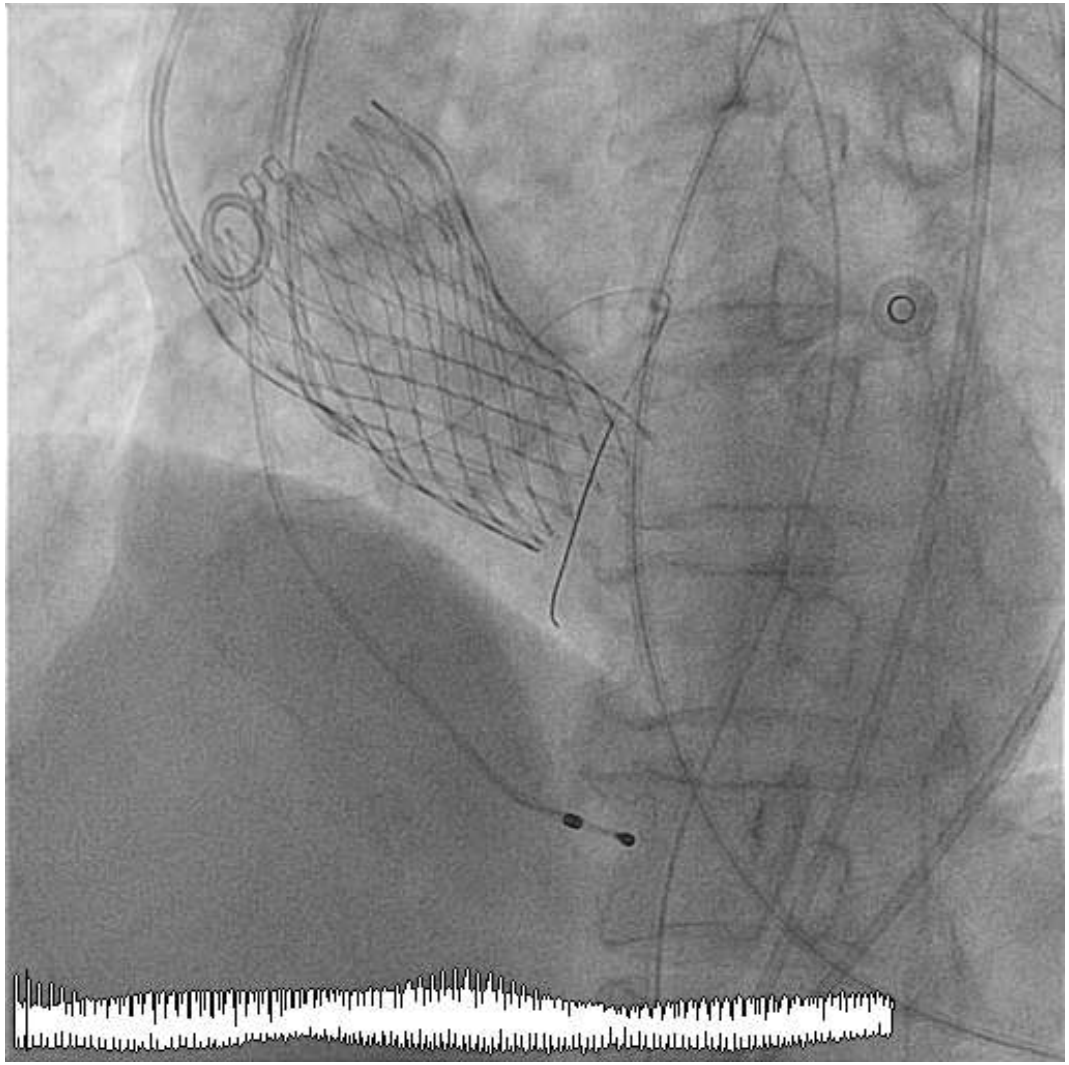
Sinus of Valsalva Diameter (mm)	23.6 LCC	**25.5** RCC	27.6 NCC
Sinus of Valsalva Height (mm)	12.0 LCC	16.2 RCC	17.4 NCC
Coronary Ostia Height (mm)	6.7 Left	12.9 Right	
LVOT Diameter (mm)	16.0 Min	x	24.2 Max

Low Coronary Height & Small Annulus





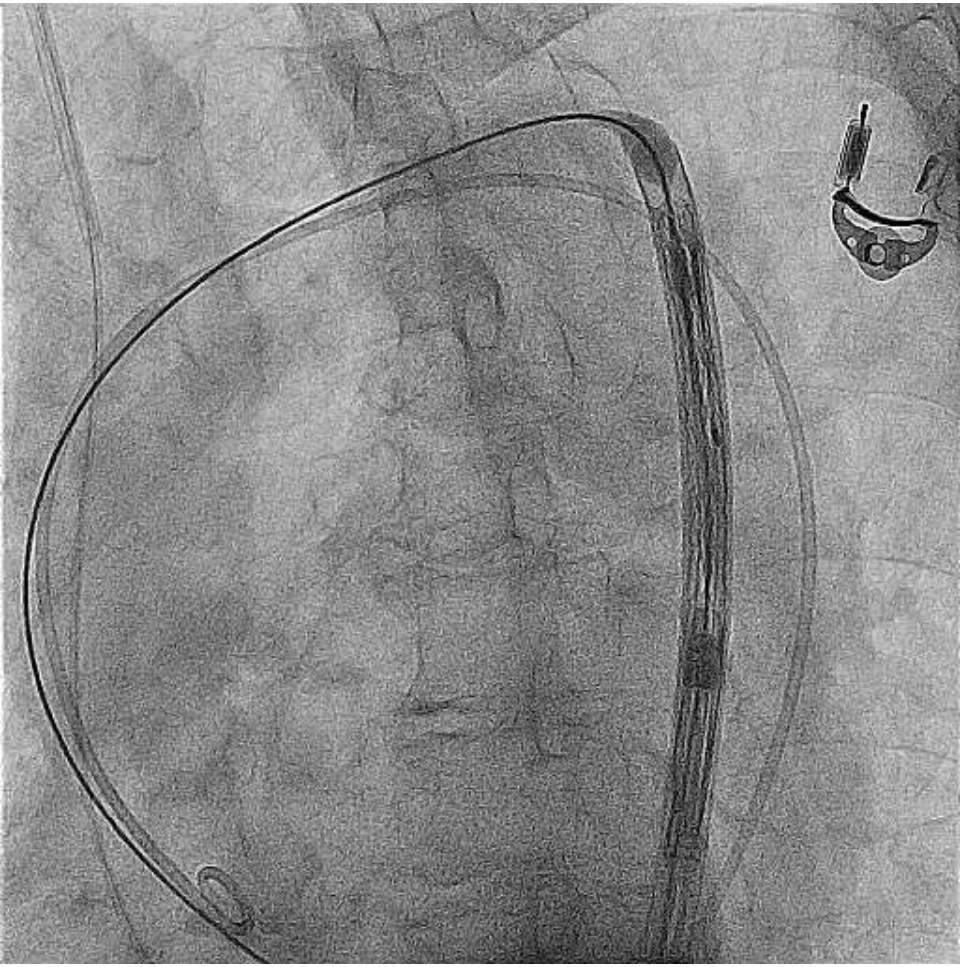
Low Coronary Height & Small Annulus

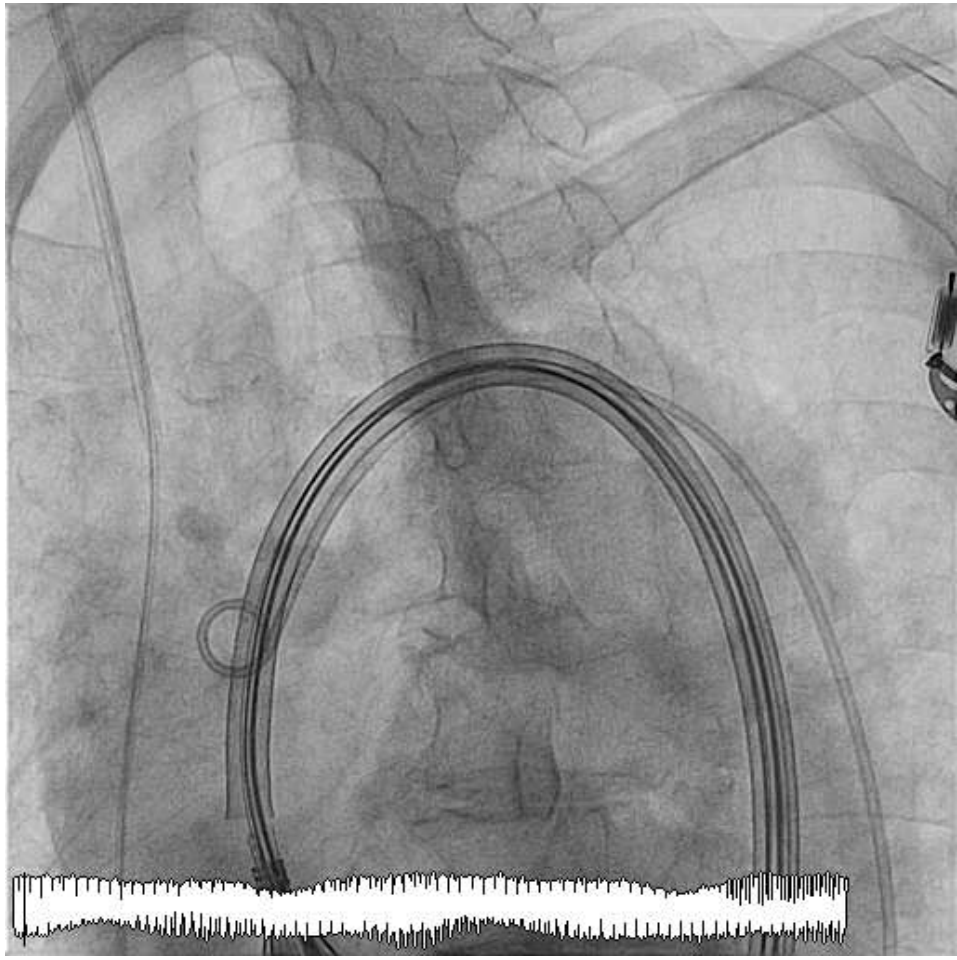


Choice of TAVR Devices

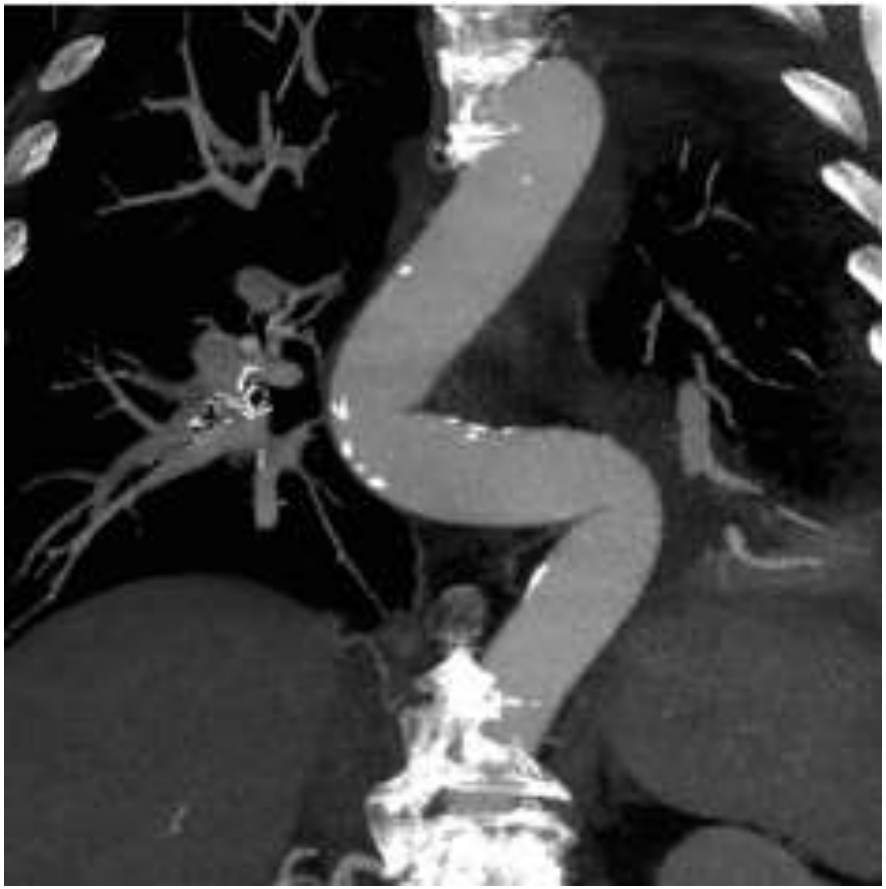
	CoreValve 	Sapien XT 	Lotus 	Portico 
Bicuspid Valve	✓	✓	✓ ✓	?
Low EF, low gradient AS	✓	✓	✓	✓ ✓
Low coronary takeoff & small annulus	✓		✓	✓

Atheromatous Aorta





Tortuous and S-shape Aorta



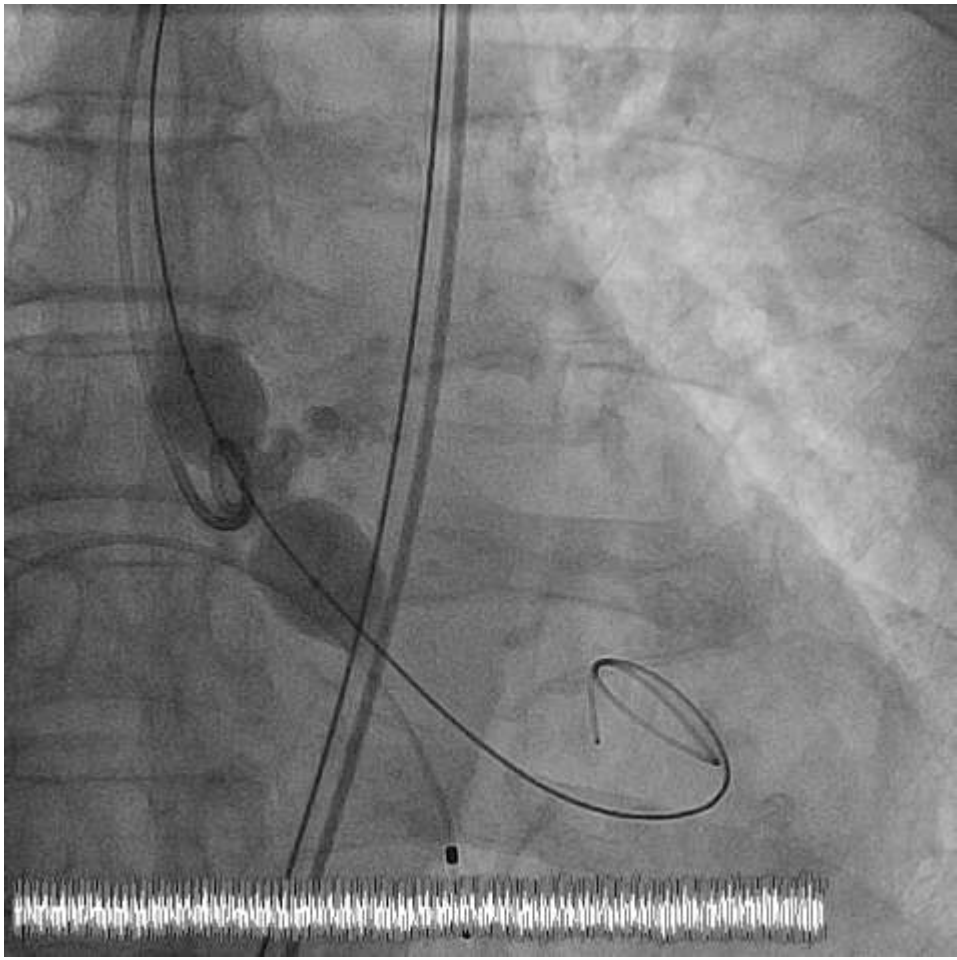
- 2016 Tokyo Valve
- Sapien XT valve deformed during navigating S-shape aorta
- The operator deployed the valve in the descending aorta

Choice of TAVR Devices

	CoreValve 	Sapien XT 	Lotus 	Portico 
Bicuspid Valve	✓	✓	✓ ✓	?
Low EF, low gradient AS	✓	✓	✓	✓ ✓
Low coronary takeoff & small annulus	✓		✓	✓
Atheromatous and tortuous aorta	✓			✓

Heavily Calcified Aortic Valve

Calcium Score > 10,000



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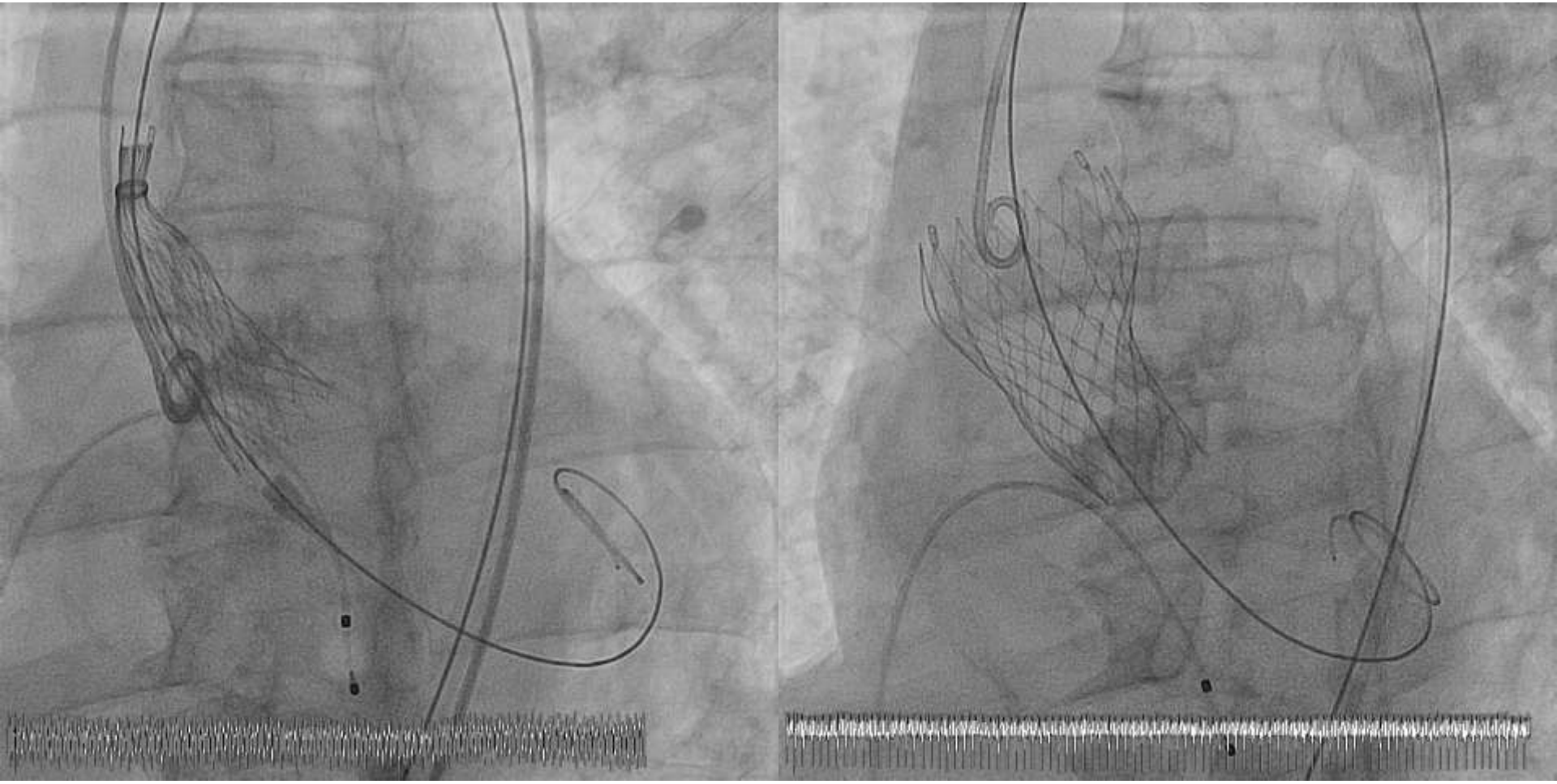

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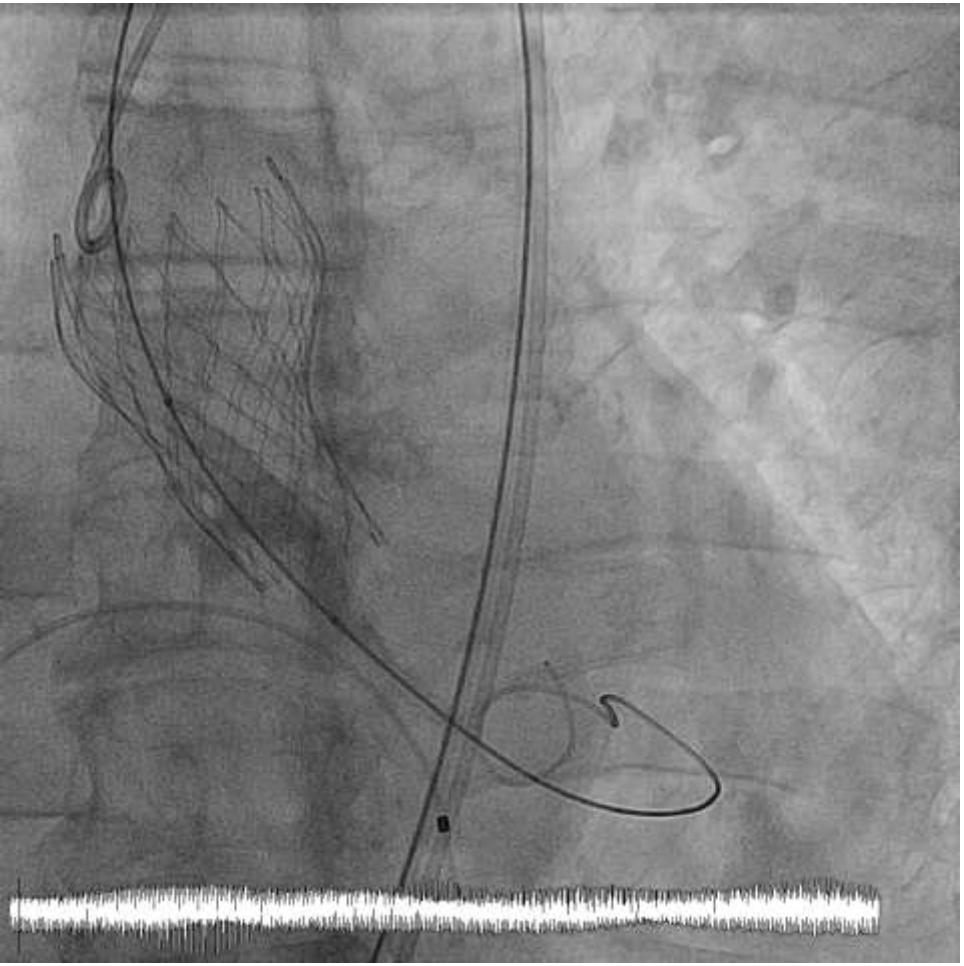

Calcium score & PVL

- 115 CoreValve implant in NTUH
- Predictors of ≥ moderate PVL: large annulus, high calcium score
- 50% of ≥ moderate PVL cases will improve 6months -1year after CoreValve implantation
- Predictors of PVL improvement: low calcium score

Conclusion

- There is no perfect valve
- Some TAVR devices may perform better in some specific individual
- The responsibility of current TAVR operator is to choose optimal device for every specific individual
- 2nd generation devices might minimize the differences