Standard vs. Minimalist TAVR

When and How to Change?

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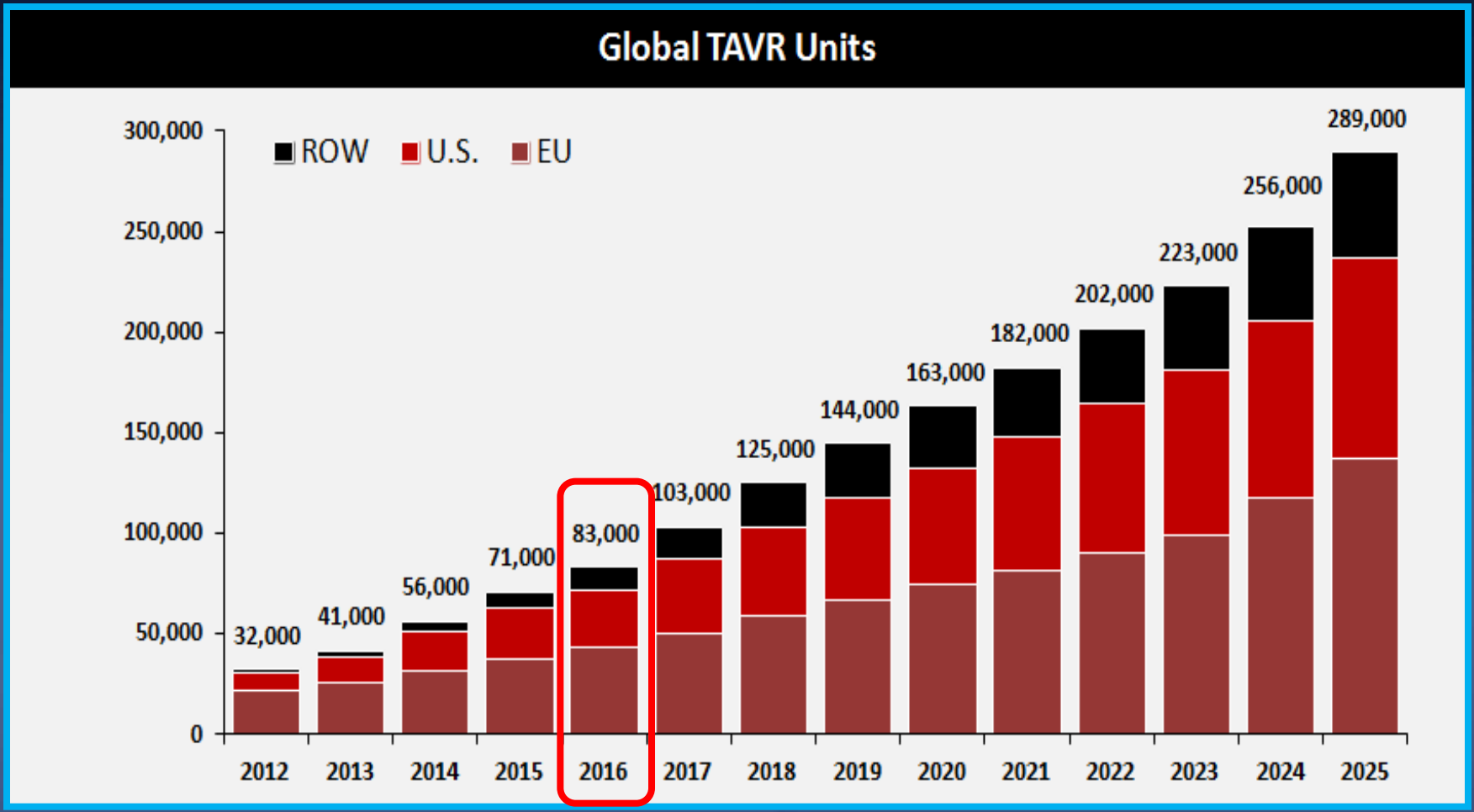
Conflict of Interest Statement

- I received lecture fees from
  - Edwards Lifesciences
  - Medtronic, and
  - Boston Scientific

Estimated Global TAVI Procedure Growth

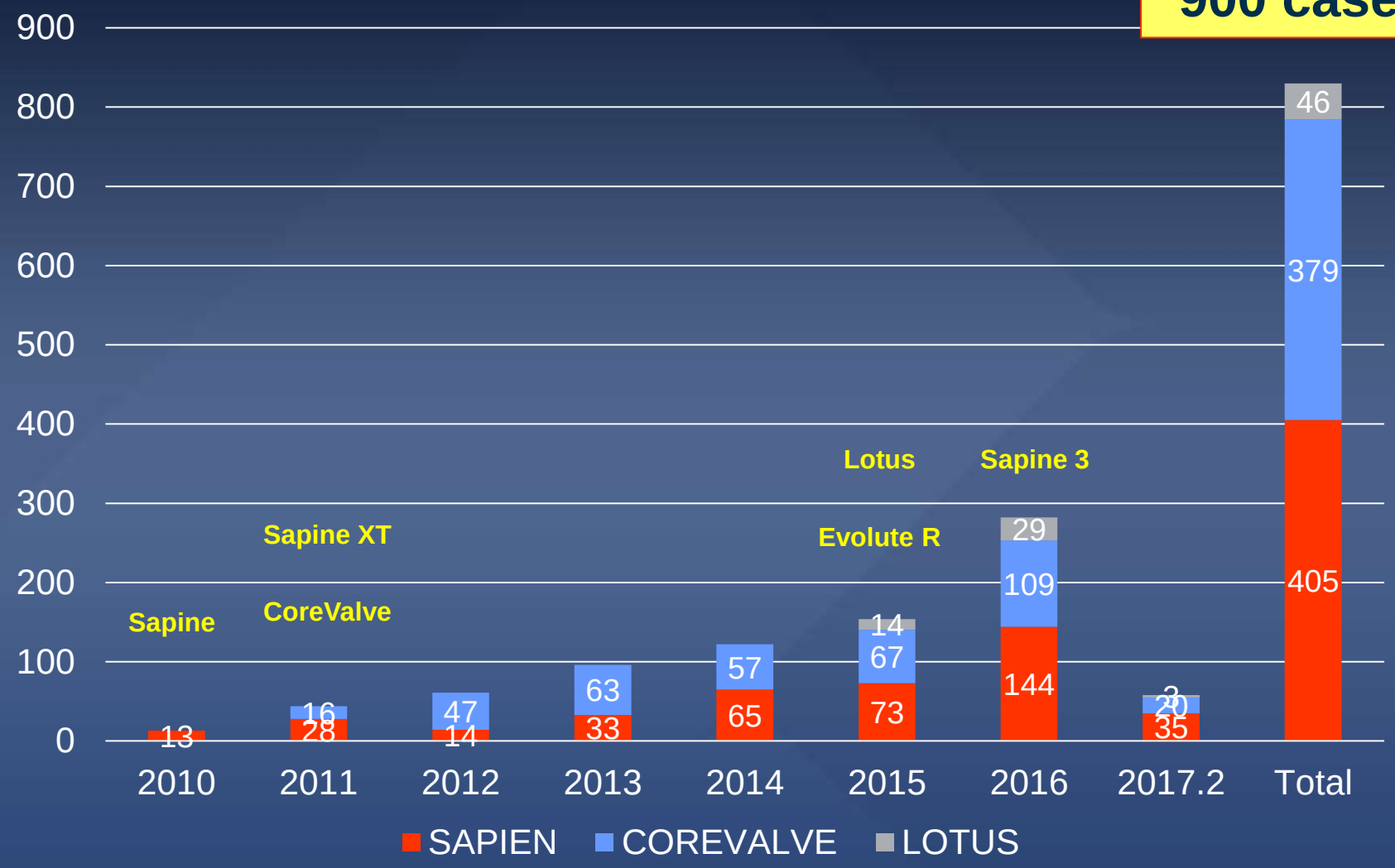


SOURCE: Credit Suisse TAVI Comment –January 8, 2015. ASP assumption for 2024 and 2025 based on analyst model. Revenue split assumption in 2025 is 45% U.S., 35% EU, 10% Japan, 10% ROW

TAVR Status in KOREA

All TAVR (2010~2017.6)

Total 900 cases



Procedural Change in Korea
: TAVR minimalist

- General anesthesia
- Intubation

TEE

Simpler TAVR

- Procedure <60 min
- 1 night stay at CCU
- Discharge on Day #3

Standard TAVR vs. Minimal TAVR

Minimal Approach:

«Assisting Staff»:

- Anesthetist (stand-by)
- Cardiac surgeon (near-by)

Prep. Table

Interventionist #1

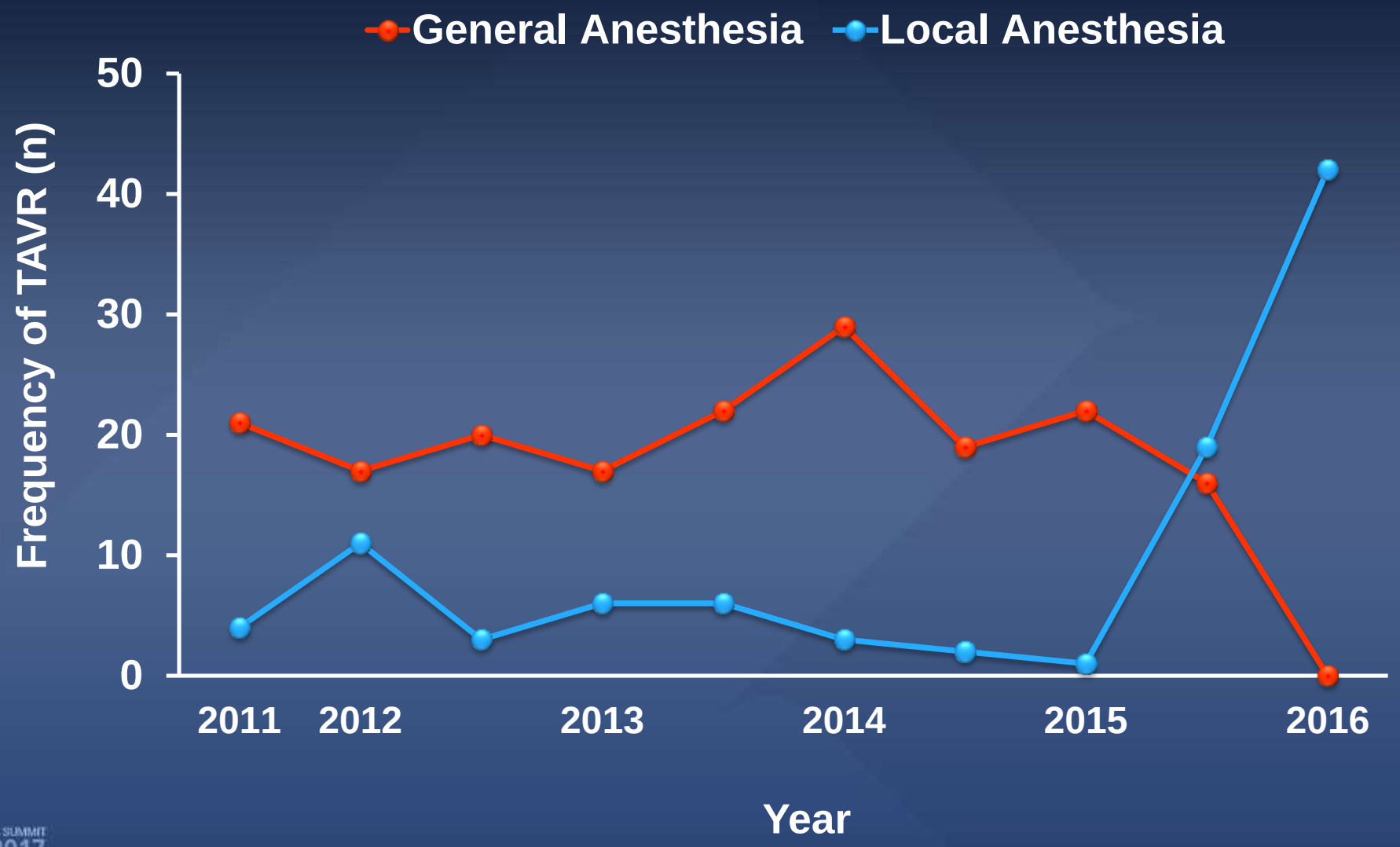
Interventionist #2

Fellow

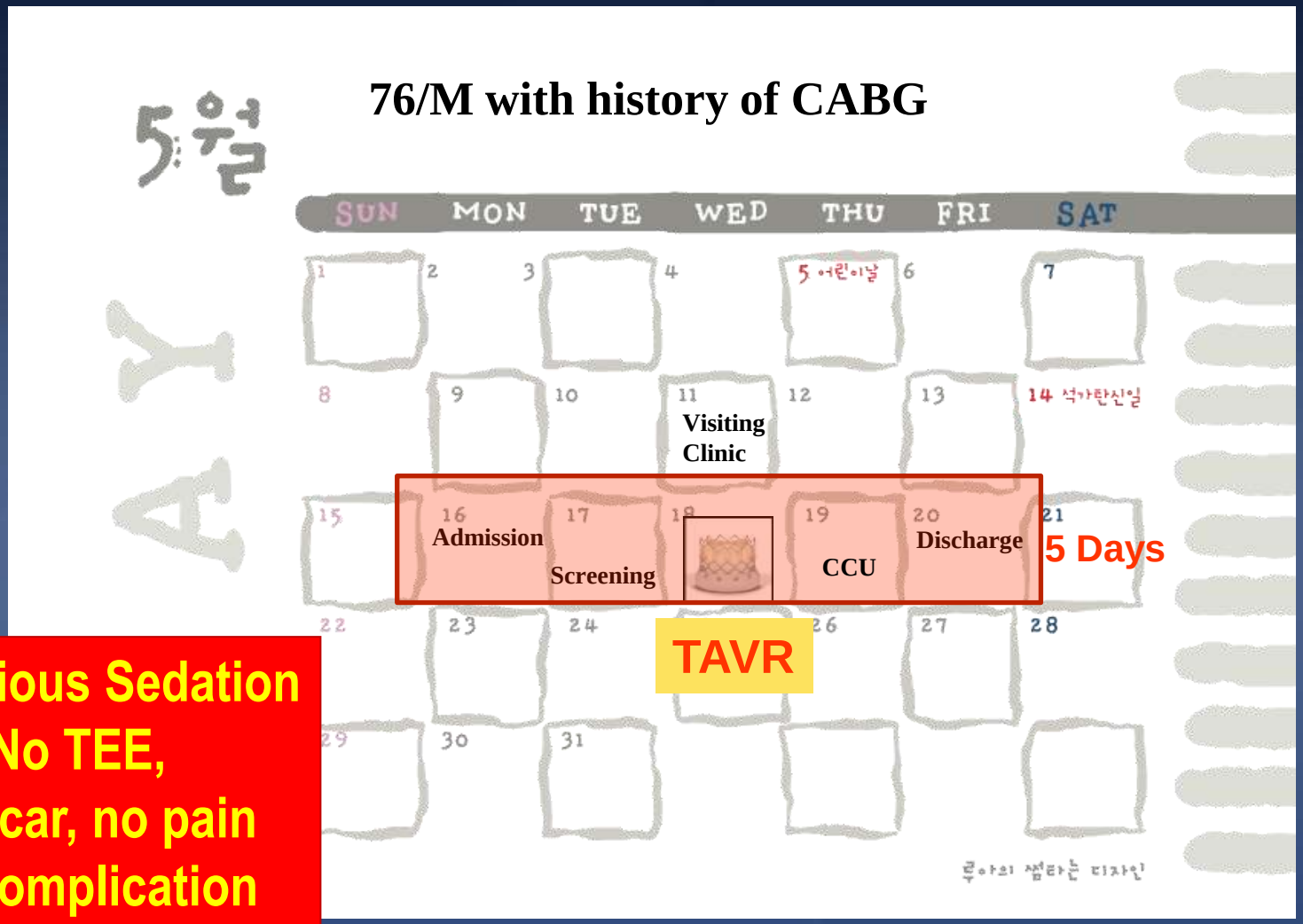
NURSE RVP

CRIMPING

Minimal vs. Standard Approach in TF-TAVR (N=288)
Trend Over Time in AMC



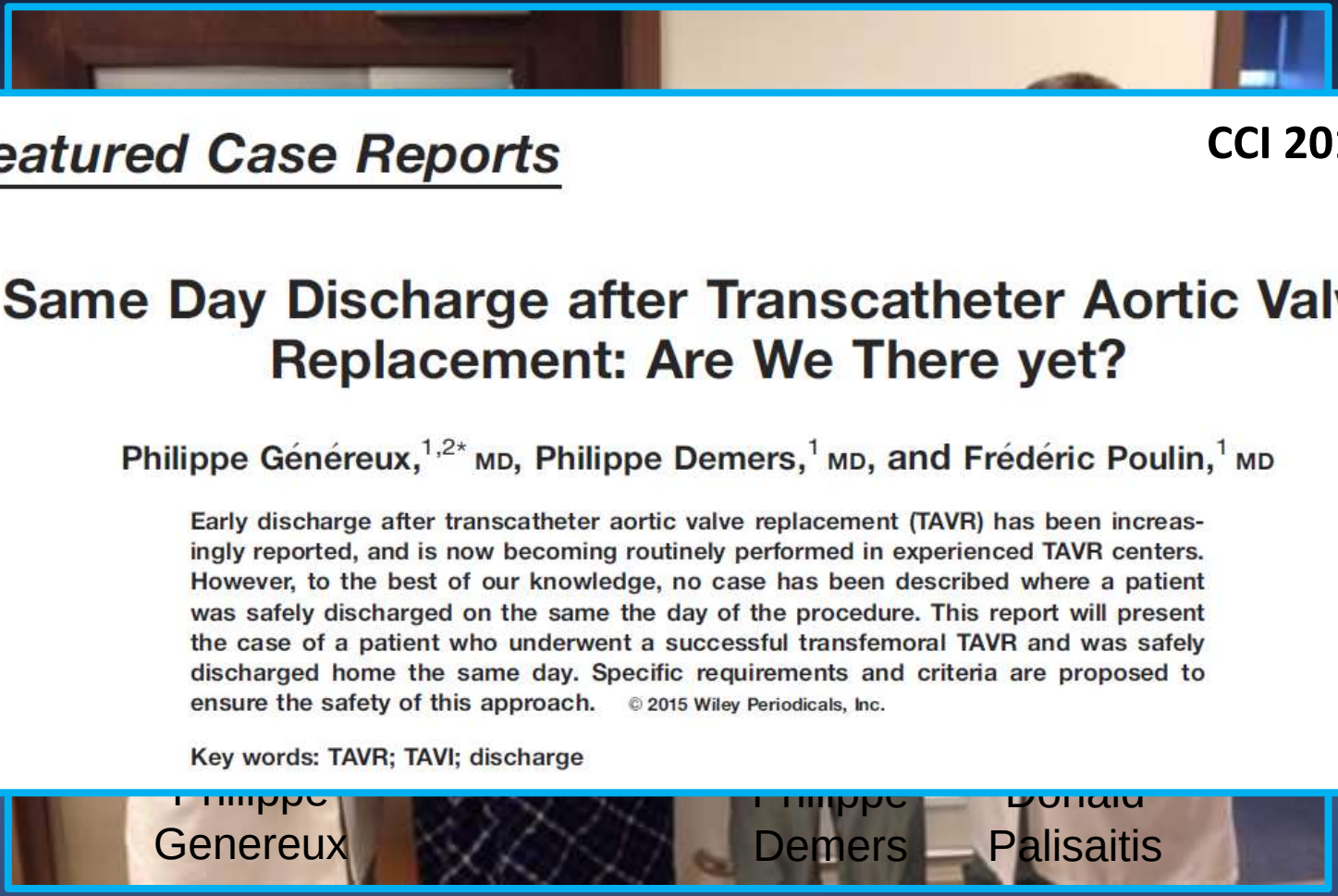
In 2017, TAVR in AMC



Conscious Sedation
No TEE,
No scar, no pain
No complication
Back home at D-2

"Outpatient" Same-Day TAVR

Sacre-Coeur Hospital; Montreal, CN



Featured Case Reports

CCI 2016

Same Day Discharge after Transcatheter Aortic Valve Replacement: Are We There yet?

Philippe Généreux,[1,2*] MD, Philippe Demers,[1] MD, and Frédéric Poulin,[1] MD

Early discharge after transcatheter aortic valve replacement (TAVR) has been increasingly reported, and is now becoming routinely performed in experienced TAVR centers. However, to the best of our knowledge, no case has been described where a patient was safely discharged on the same the day of the procedure. This report will present the case of a patient who underwent a successful transfemoral TAVR and was safely discharged home the same day. Specific requirements and criteria are proposed to ensure the safety of this approach.

Key words: TAVR; TAVI; discharge

Genereux Demers Palisaitis

Genereux P et al. Catheter Cardiovasc Interv 2016;87:980-2

Debate in TAVR

To date, no RCTs have compared the conventional, more invasive, GA with MAC for TAVR. Therefore, there is still controversy about which would be best for patients' outcomes

iFORUM

DEBATES IN IMAGING

Optimal Imaging for Guiding TAVR: Transesophageal or Transthoracic Echocardiography, or Just Fluoroscopy?

Itzhak Kronzon, MD, Vladimir Jelnin, MD, Carlos E. Ruiz, MD, PhD, Muhamed Saric, MD, PhD, Mathew Russell Williams, MD, Albert M. Kasel, MD, Anupama Shivaraju, MD, Antonio Colombo, MD, Adnan Kastrati, MD

JACC: CARDIOVASCULAR IMAGING VOL. 8, NO. 3, 2015

ISSN 1936-878X/$36.00
PUBLISHED BY ELSEVIER INC. http://dx.doi.org/10.1016/j.jcmg.2015.01.003

Debate Points

- Is the routine use of TEE always beneficial?
  ➔ 3D CT planning is almost sufficient in the routine TAVR practice.

- What are the real risks of not having a routine TEE during TAVR?
  ➔ Is there a justified concern that PVL will either be underestimated or missed entirely?

JACC: CARDIOVASCULAR INTERVENTIONS VOL. 7, NO. 8, 2014
AUGUST 2014:898–904

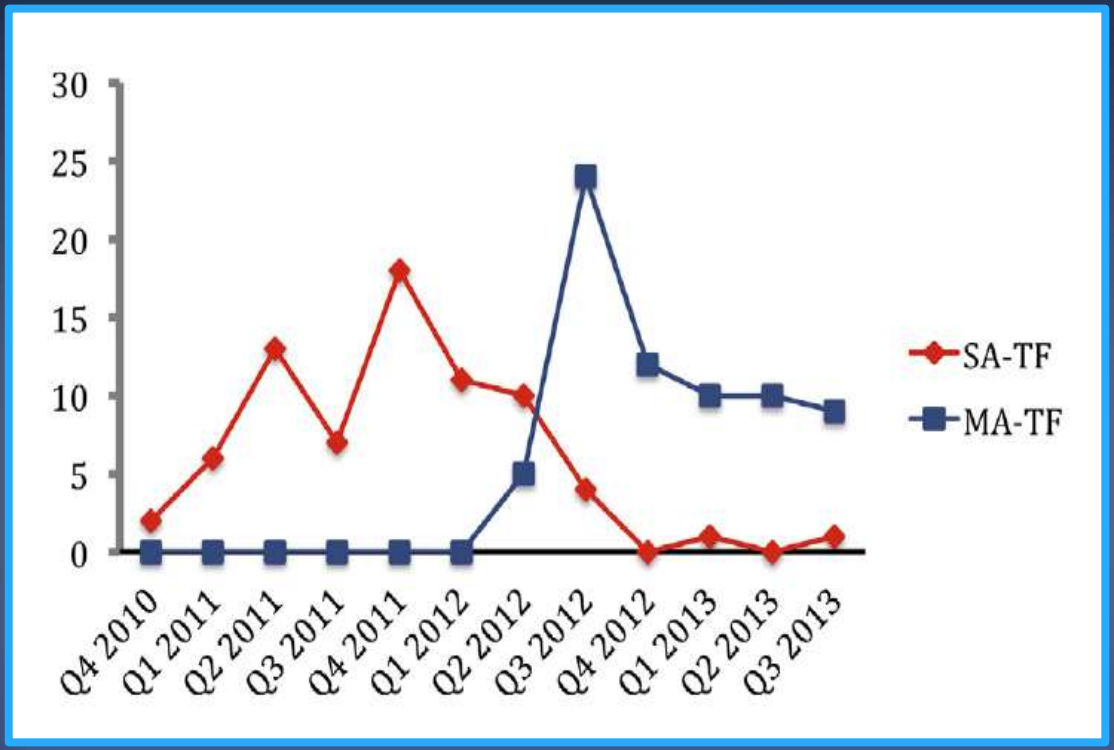
Comparison of Transfemoral Transcatheter Aortic Valve Replacement Performed in the Catheterization Laboratory (Minimalist Approach) Versus Hybrid Operating Room (Standard Approach)

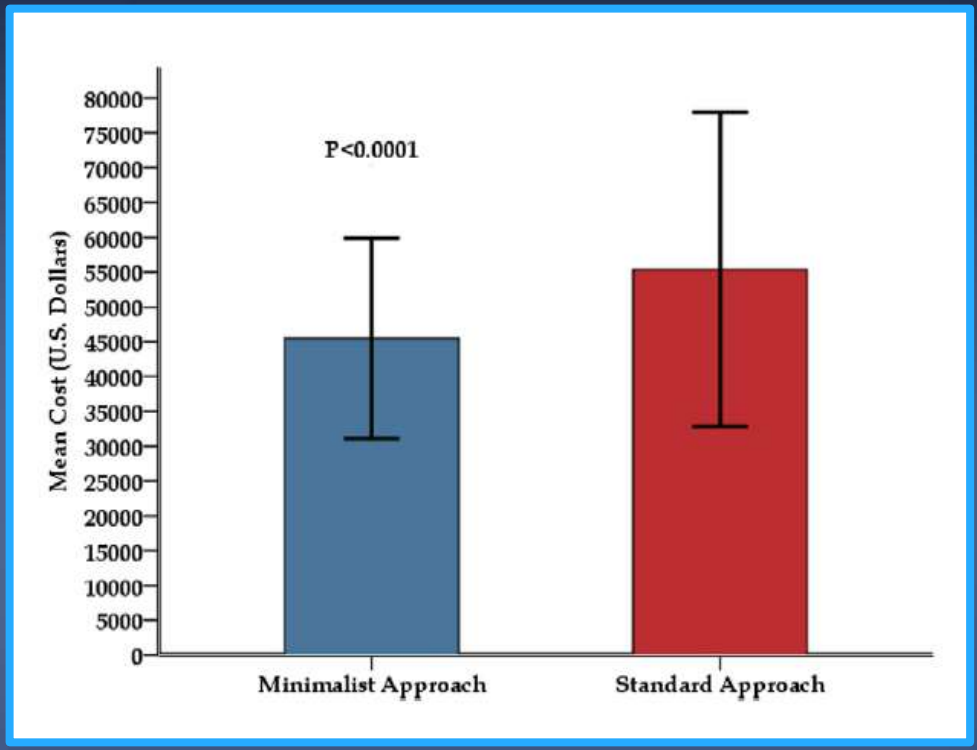
Outcomes and Cost Analysis

- Minimal approach (MA): TAVR w/o general anesthesia, TEE, or a surgical hybrid room.
- A total of 142 patients: 70 MA vs. 72 standard approach at Emory University, USA.

J Am Coll Cardiol Intv 2014;7:898–904.

Minimal vs. Standard Approach
Trend Over Time and Total Costs



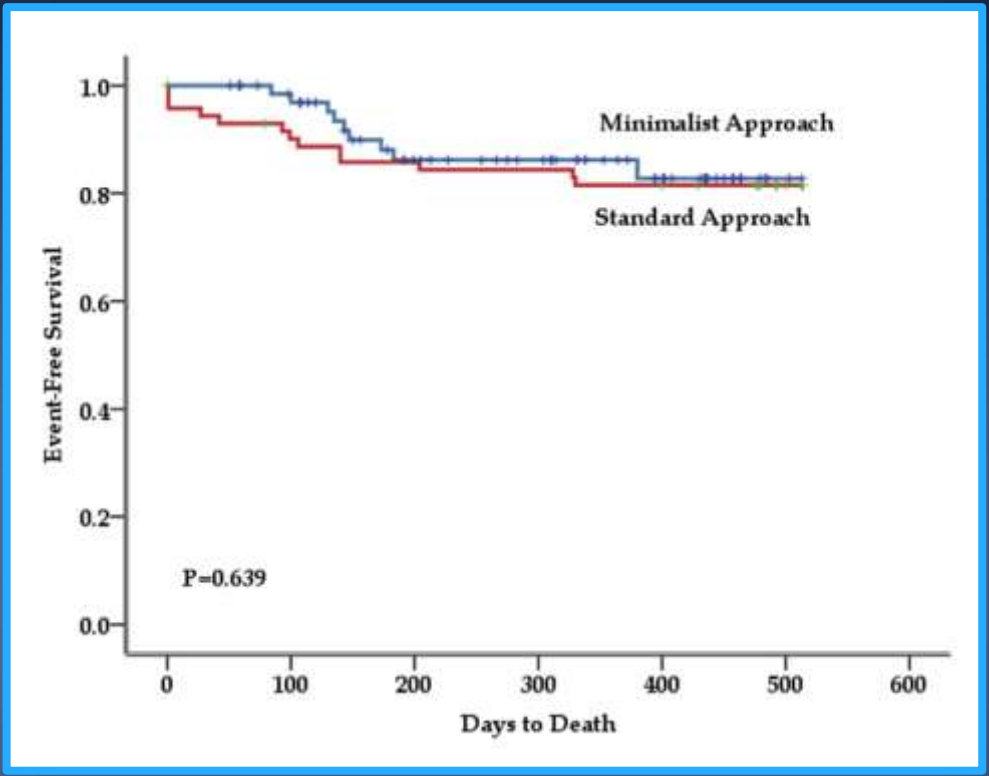


J Am Coll Cardiol Intv 2014;7:898–904.

Minimal vs. Standard Approach
Outcome

TABLE 3 Outcomes

Outcome	Minimalist Approach (n = 70)	Standard Approach (n = 72)	p Value
In-hospital mortality	0 (0)	3 (4.2)	0.24
Patients receiving ICU care	53 (75)	69 (100)	<0.001
Total ICU time, h*	22 (2-28)	28 (23-48)	<0.001
Length of stay, days*	4 (3-7)	6 (4-9)	0.01
Length of stay: procedure to discharge, days*	3 (2-4)	5 (3-6.5)	<0.001



J Am Coll Cardiol Intv 2014;7:898–904.

Structural Heart Disease

Clinical Outcomes and Safety of Transfemoral Aortic Valve Implantation Under General Versus Local Anesthesia

Subanalysis of the French Aortic National CoreValve and Edwards 2 Registry

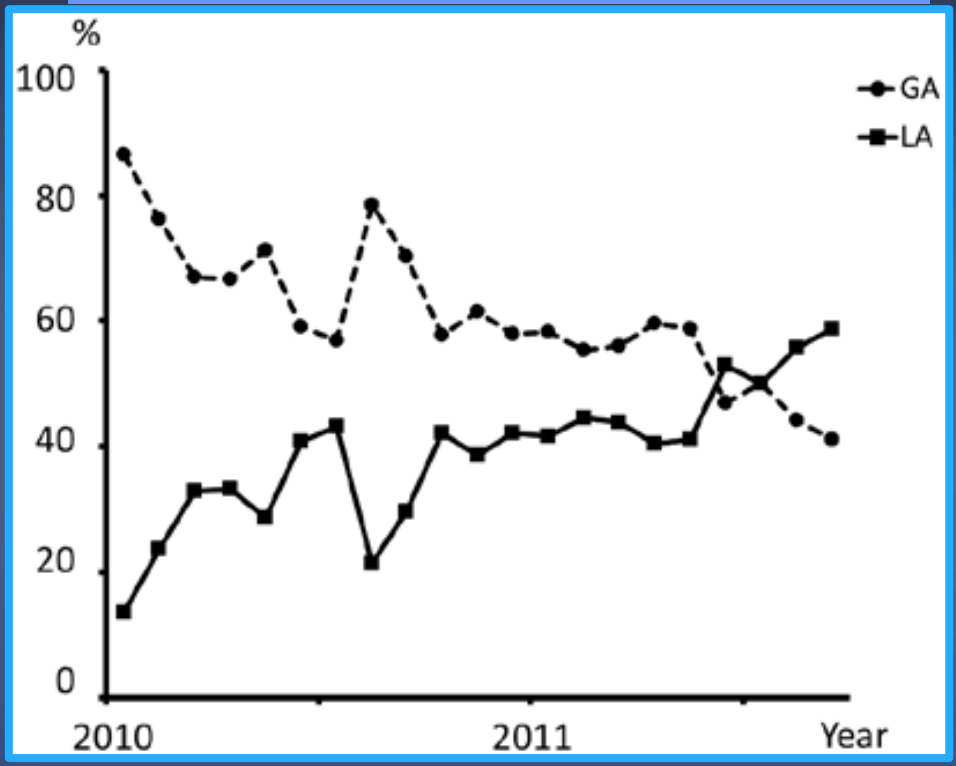
Atsushi Oguri, MD; Masanori Yamamoto, MD; Gauthier Mouillet, MD; Martine Gilard, MD; Marc Laskar, MD; Helene Eltchaninoff, MD; Jean Fajadet, MD; Bernard Iung, MD; Patrick Donzeau-Gouge, MD; Pascal Leprince, MD; Alain Leguerrier, MD; Alain Prat, MD; Michel Lievre, PhD; Karine Chevreul, MD; Jean-Luc Dubois-Rande, MD; Romain Chopard, MD; Eric Van Belle, MD; Toshiaki Otsuka, MD; Emmanuel Teiger, MD; on behalf of FRANCE 2 Registry Investigators

- 2326 TF-TAVR patients in the FRANCE 2 registry.
- All patients: GA (n=1377) and LA (n=949)
- Propensity-matched cohort (N=401)

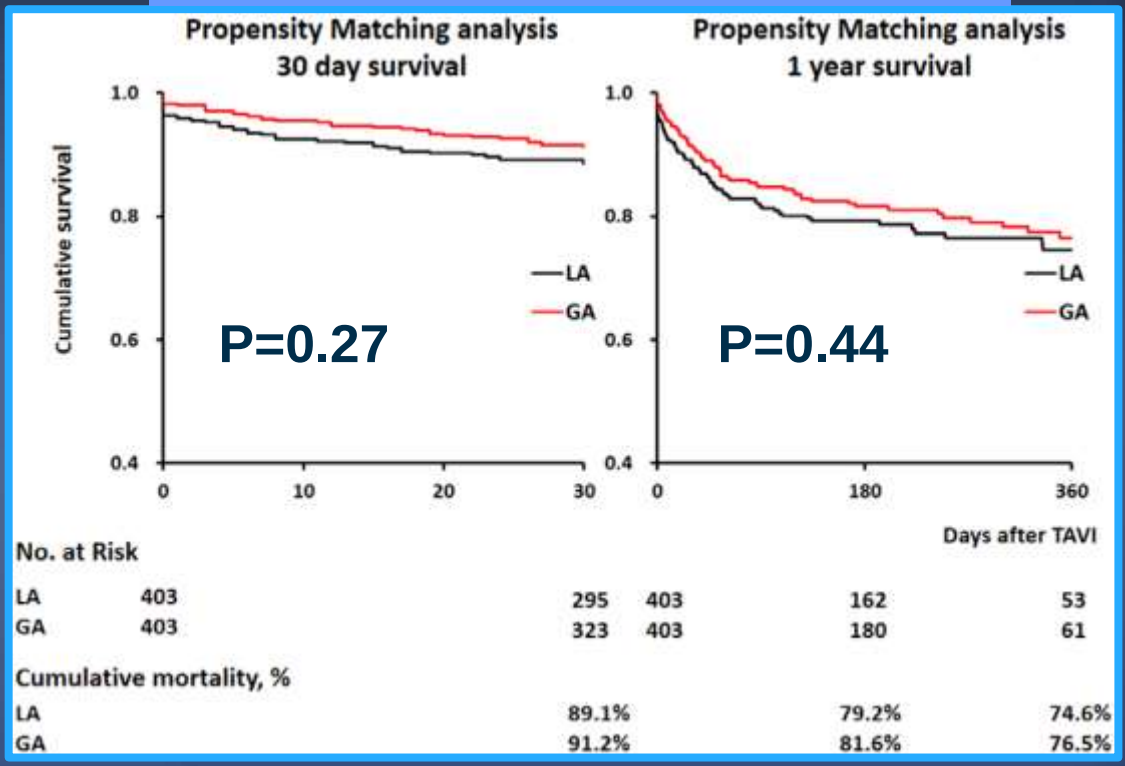
Circ Cardiovasc Interv. 2014;7:602-610

Change of TAVR Pattern and Outcome

Change of Anesthesia



Mortality of Propensity-Matched Cohort

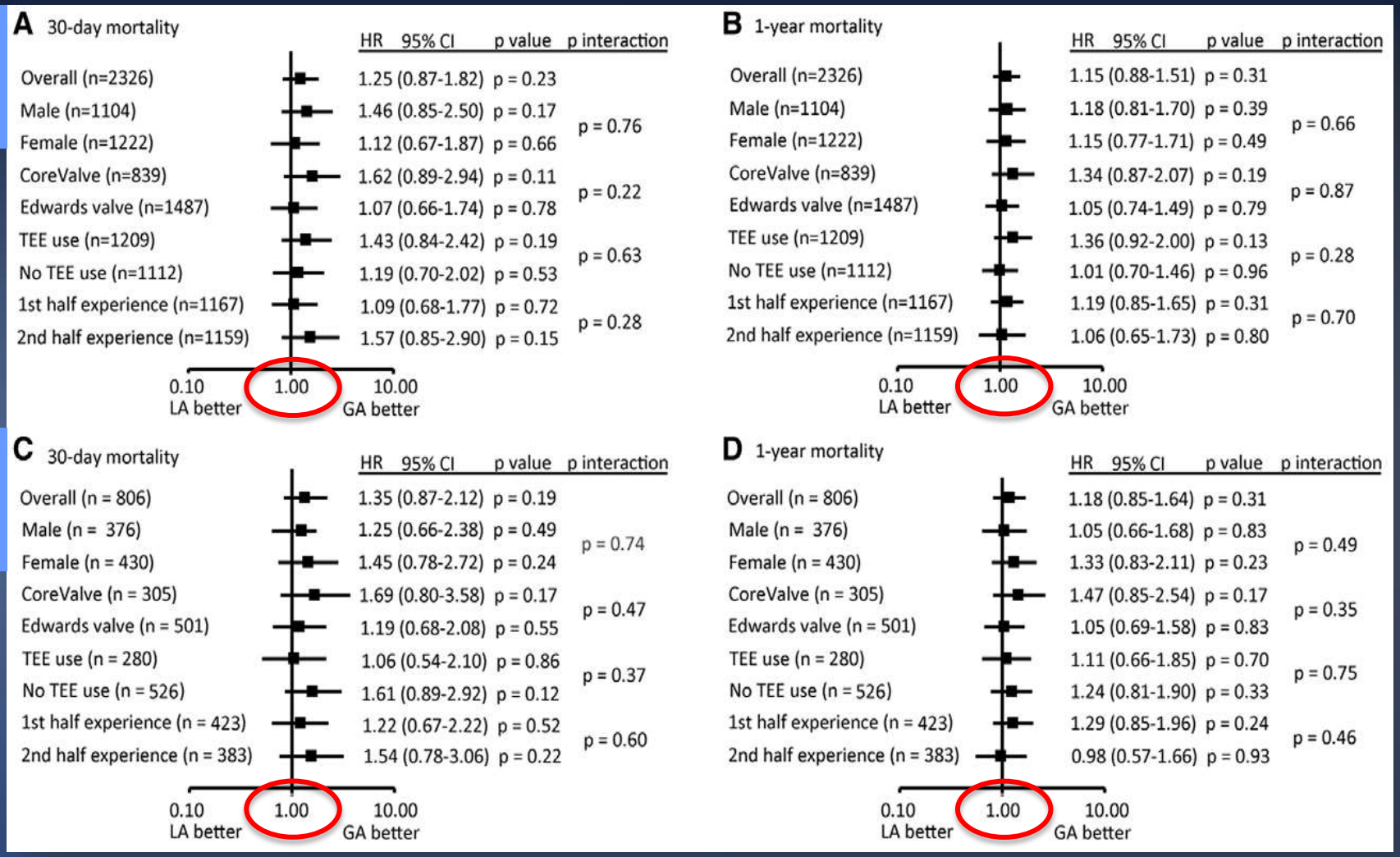


Circ Cardiovasc Interv. 2014;7:602-610

Local vs. General Anesthesia
No Mortality benefit with GA

Overall Cohort

Propensity Cohort



Circ Cardiovasc Interv. 2014;7:602-610

How is TAVR minimalist feasible in ASAN Medical Center (AMC)?

- Pre-procedural TEE evaluation: anatomy evaluation
- Pre-procedural CT evaluation: device selection and sizing
- Increasing expertise: confidence in procedure
- Simplified TAVR procedure itself
  - Fluoroscopy-based procedure
  - Immediate complication: fluoroscopy and TTE

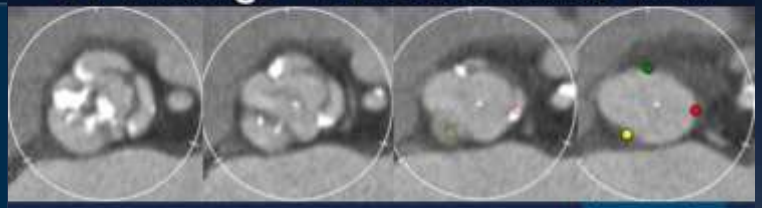
Pre-Procedural CT Assessment

- 71/F, 157 cm, 47.5 kg, BMI 19.27, BSA 1.44
- Chief complaints
  - Dyspnea (NYHA III)
- Medical history
  - ESRD s/p KT (1991), spinal stenosis, osteoporosis
  - Pericardial effusion s/p PCC (2017.3)
- ECG : paroxysmal AF with RVR
- Serum Cr : 1.48
- PFT : FEV1 0.94 (43%) / FVC 1.15 (40%) = 82%
- STS score = 3.081 %
- Euroscore I = 2.68 %, Euroscore II = 2.66 %

Echo findings

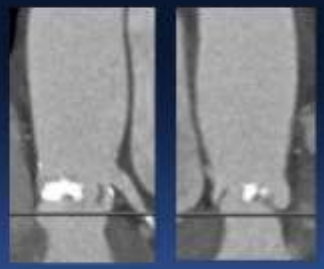
- Tricuspid valve
- AVA = 0.55 cm^2
- Peak / Mean PG = 119 / 63 mm Hg
- V max = 5.5 m/s
- EF= 71 %
- LVOT diameter, TTE: 19.4 mm
- Severe degenerative AS
- Mild AR
- Pericardial effusion

CT findings – Aortic annulus view



Aortic Annulus parameters	
Annulus short diameter	17.7 mm
Annulus long diameter	25.4 mm
Annululs mean diameter	21.5 mm
Annulus area	353.6 mm^2
Annulus area-driven diameter	21.2 mm
Annulus perimeter	68.6 mm
Annulus perimeter-driven diameter	21.9 mm

CT findings – Coronary Height

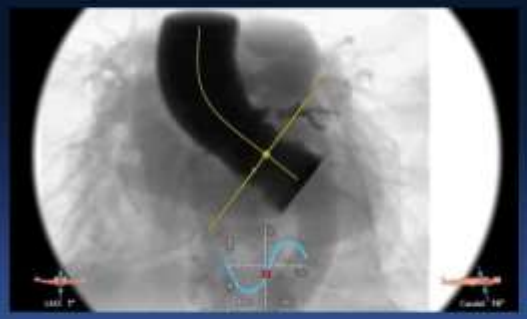


Anomalous origin of RCA from LCC

Coronary Height	
LCA	10.5 mm
RCA	13.5 mm

CT findings – Ileofemoral Angio

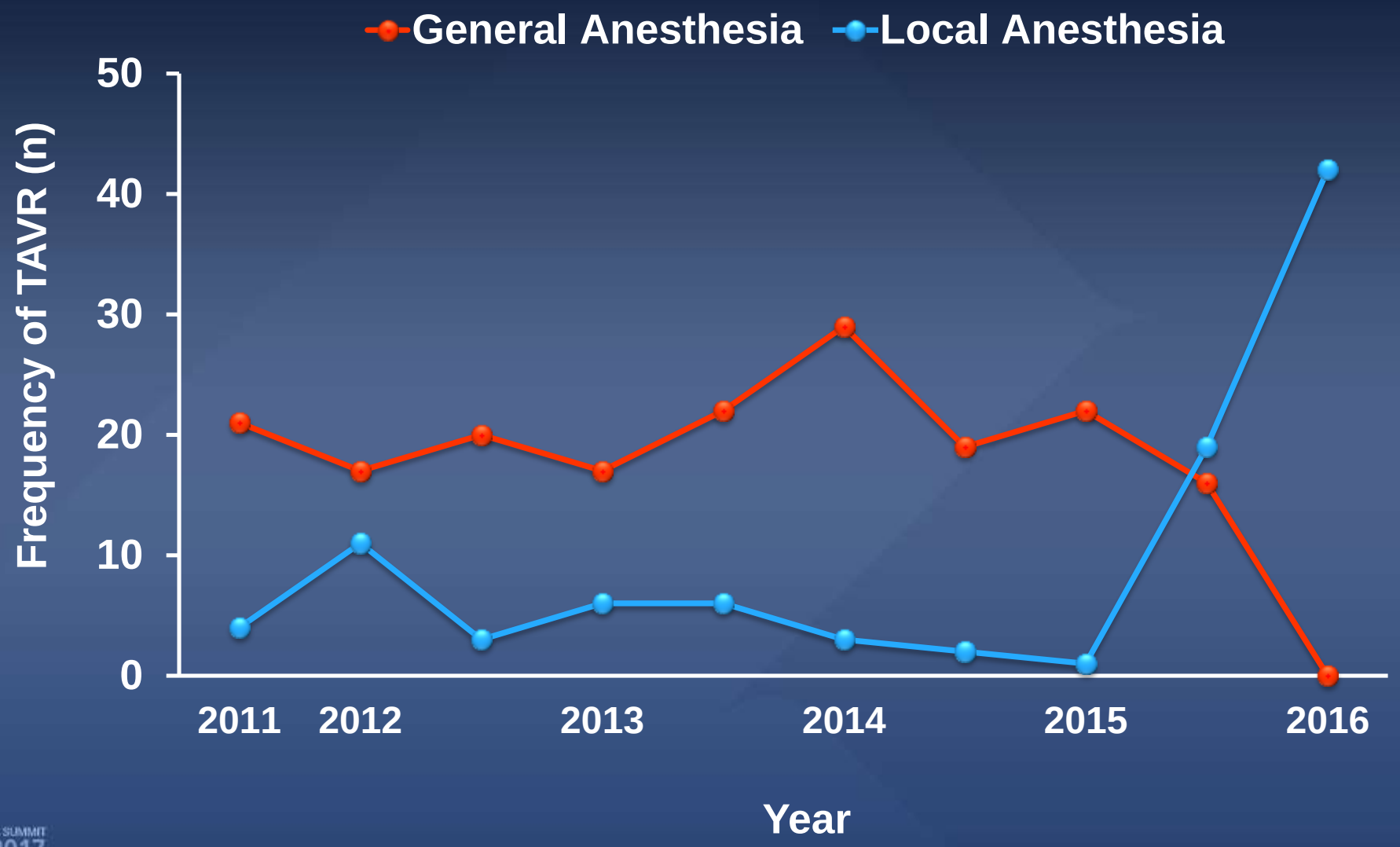
Aortic annulus plane for fluoroscopy



Right coronary
Non-coronary
Left coronary

LAO 1
CAUD 16
RR-interval 30%

Minimal vs. Standard Approach in TF-TAVR (N=288)
Trend Over Time in AMC



TF-TAVR in AMC
Procedural Outcomes

	Overall (N = 285)	General Anesthesia (N = 183)	MAC (N = 102)	P value
Procedural success	277 (97.2%)	176 (96.2%)	101 (99.0%)	0.17
Conversion to surgery	5 (1.8%)	5 (2.7%)	0	0.09
Coronary obstruction	1 (0.4%)	1 (0.5%)	0	0.46
Implantation of two valves	13 (4.6%)	11 (6.0%)	2 (2.0%)	0.11
New permanent pacemaker	30 (10.6%)	19 (10.4%)	11 (11.1%)	0.85
Paravalvular leakage ≥ moderate	37 (13.0%)	30 (16.4%)	7 (6.9%)	0.02
Major vascular complication	16 (5.7%)	15 (8.2%)	1 (1.0%)	0.02
Length of hospital stay (days)	8.7±8.9	10.4±9.4	5.7±5.3	<0.01

TF-TAVR in AMC
30 Days Clinical Outcomes

	Overall (N = 285)	General Anesthesia (N = 183)	MAC (N = 102)	P value
Death, all	9 (3.2%)	8 (4.4%)	1 (1.0%)	0.12
Cardiac death	6 (2.1%)	6 (3.3%)	0	0.07
Non-cardiac death	3 (1.1%)	2 (1.1%)	1 (1.0%)	0.93
Stroke, all	12 (4.2%)	11 (6.0%)	1 (1.0%)	0.04
Disabling	5 (1.8%)	4 (2.2%)	1 (1.0%)	0.46
Non-disabling	7 (2.5%)	7 (3.8%)	0	0.05
Death or disabling stroke	14 (4.9%)	12 (6.6%)	2 (2.0%)	0.09
Bleeding	112 (39.3%)	80 (43.7%)	32 (31.4%)	0.04
Life-threatening	25 (8.8%)	20 (10.9%)	5 (4.9%)	0.09
Major	64 (22.5%)	42 (23.0%)	22 (21.6%)	0.79

Key Milestones before Starting a Minimalist TAVR at Asan Medical Center

- Perfection of a percutaneous approach with 14-18Fr sheaths
- More sophisticated understanding of TAVR sizing (multi-modality imaging) and own algorithm for valve sizing.
- Increased experience of the heart team
  - We had done ~200 TAVR prior to Minimalist TAVR
- Strong support from the anesthesiologist
- “Tips and tricks” for co-axial deployment with just fluoroscopy.
- Transition from TEE to TTE

In Summary

- An international trend toward minimalist TAVR.
  - appears as safe as conventional strategy
  - rapid recovery, shorter length of stay, and dramatic reduction in cost are achievable.
- When an experienced TAVR center decides to transition from GA to MAC;
  - procedural expertise, collaborative heart-team approach and anesthesia care should be guaranteed.
  - acute procedural success and long-term outcomes should not be jeopardized.