Ultra-Minimalist TAVR – Strategies for a Quick Procedure and Short Hospital Stay

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Disclosures

- None relevant to this presentation

The NEW ENGLAND JOURNAL of MEDICINE

Transcatheter versus Surgical Aortic-Valve Replacement in High-Risk Patients

THE PARTNER TRIAL

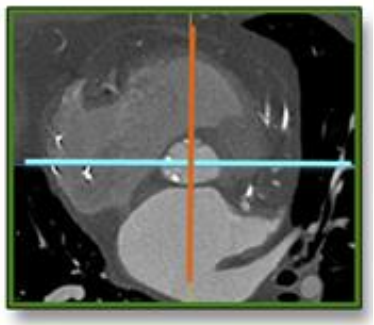
- 100% general anesthesia with TEE guidance
- ~ 30% transapical (transfemoral by surgical cutdown)
- ~ 6% neurologic events
- ~ 17% vascular complications
- ~ 9% major bleeding
- ~ 3% renal replacement therapy
- ~ 4% new pacemaker
- Median ICU stay 3 days
- Median LOS 8 days

C Smith et al. 2011;364:2187-98

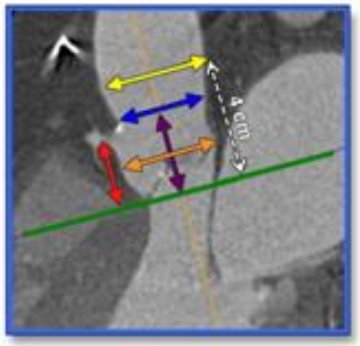
How TAVR Became More Efficient

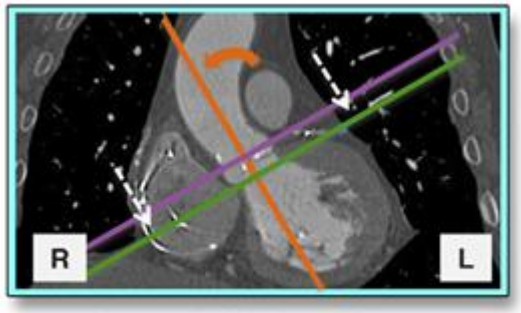
- Increased experience
- CT Imaging
- Percutaneous access and closure
- Smaller sheath sizes
- Conscious sedation
- Better case and discharge planning
- Other novel practices

The First Breakthroughs – CT Planning and Percutaneous Access & Closure

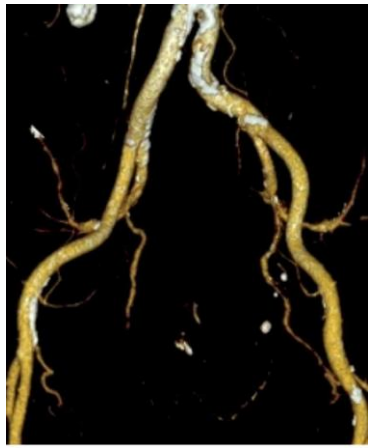


Transverse Plane

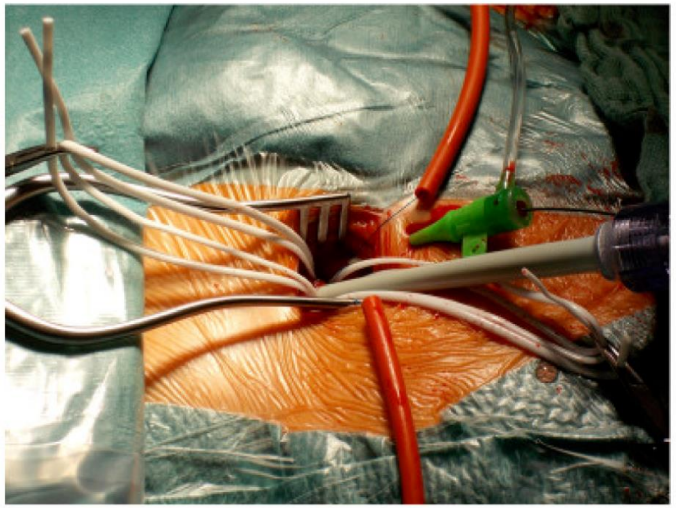


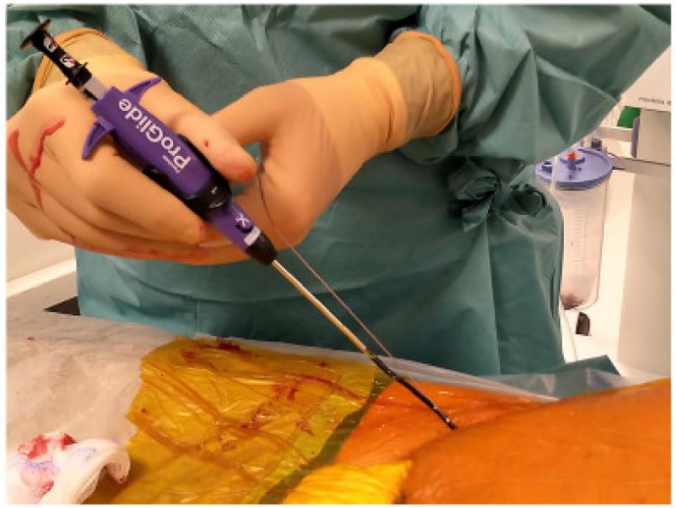


Coronal Oblique Plane



Valve sizing, coronary heights, deployment angle, access etc.





2013 2016 2017 2019

Decreased procedure time and LOS

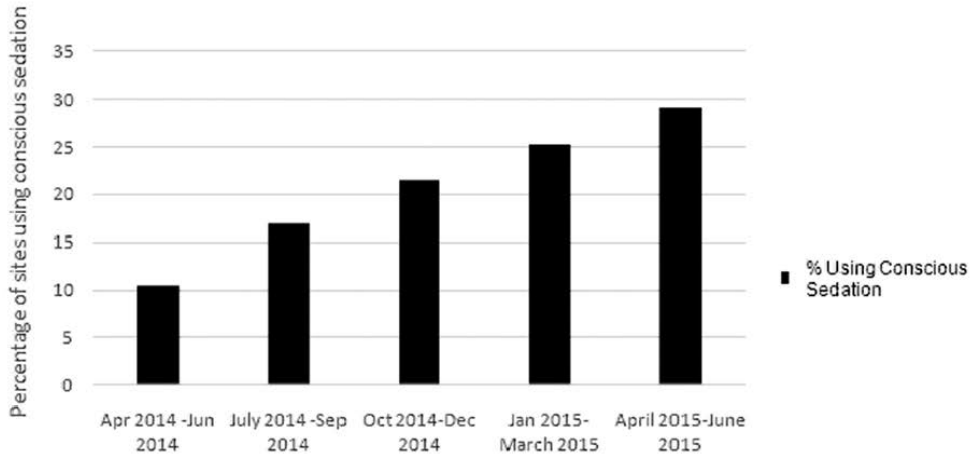
Kasel et al *JACC Imaging* 2013;6:249-52
Eckner et al. *J Clin Med* 2021;10:1344,1-9

The Next Big Breakthrough – Conscious Sedation

Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION

Conscious Sedation Versus General Anesthesia for Transcatheter Aortic Valve Replacement

Insights from the National Cardiovascular Data Registry Society of Thoracic Surgeons/American College of Cardiology Transcatheter Valve Therapy Registry

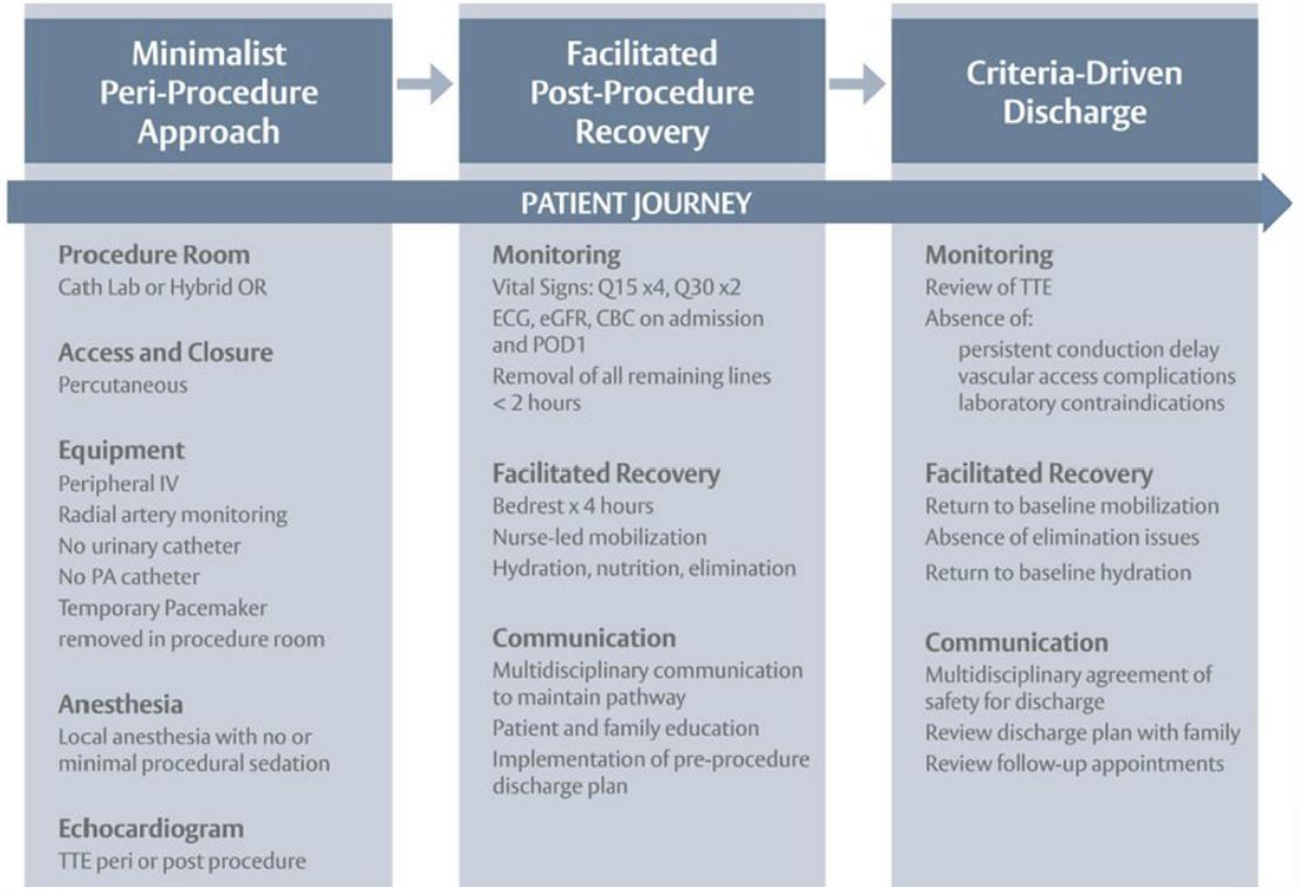


Conscious sedation was associated with reductions in procedural inotrope requirement, intensive care unit and hospital length of stay (6.0 versus 6.5 days, $P<0.001$), and combined 30-day death/stroke rates (4.8% versus 6.4%, $P<0.001$).

Hyman et al. 2017;136:2132-40

The Vancouver 3M (Multidisciplinary, Multimodality, But Minimalist) Clinical Pathway Facilitates Safe Next-Day Discharge Home at Low-, Medium-, and High-Volume Transfemoral Transcatheter Aortic Valve Replacement Centers

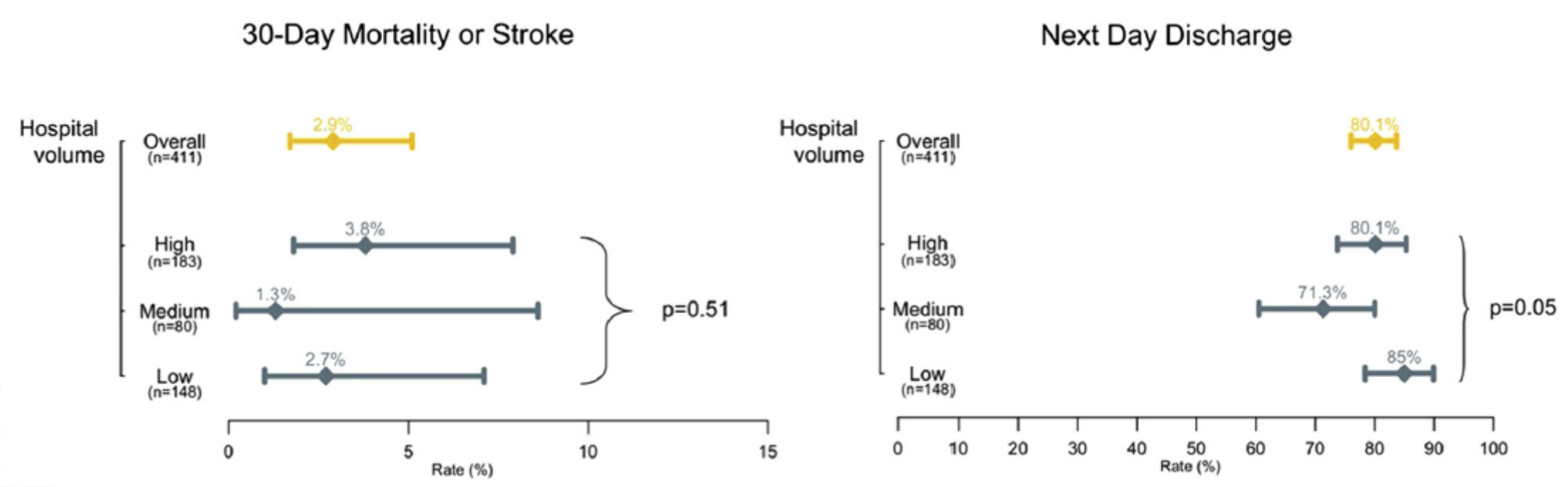
The 3M TAVR Study



Vancouver 3M TAVR Clinical Pathway

Wood et al. 2019;12:459-69

Vancouver 3M TAVR Clinical Pathway

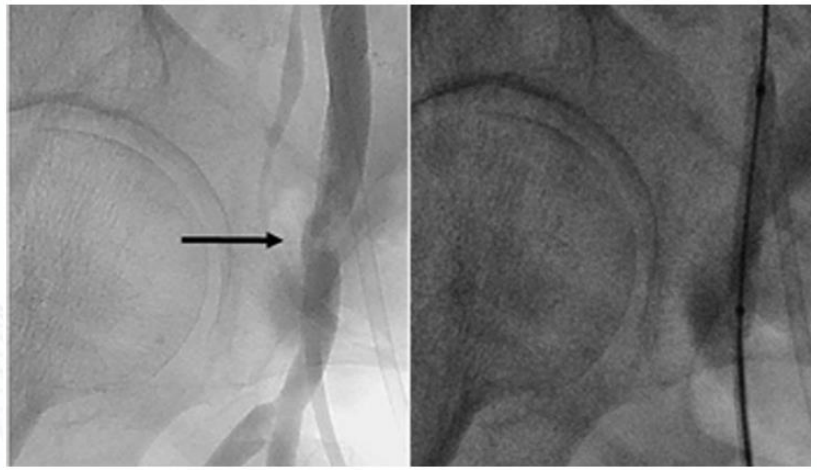


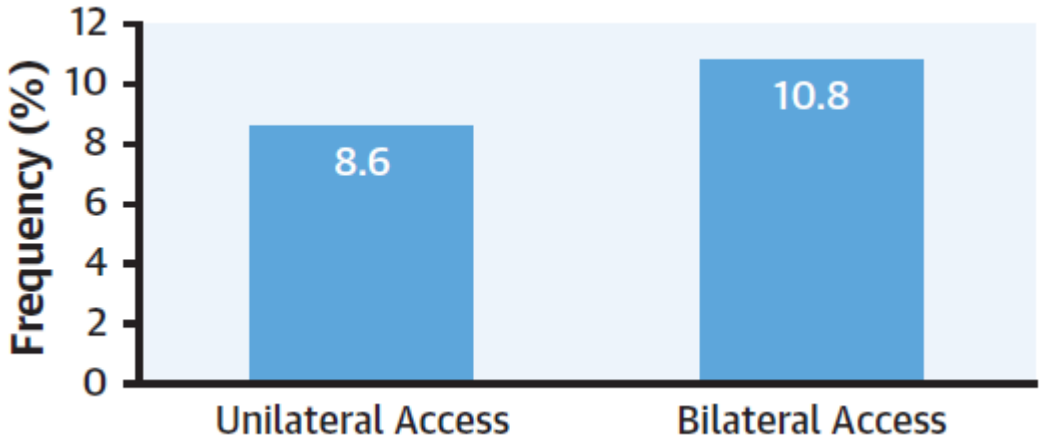
Wood et al. 2019;12:459-69

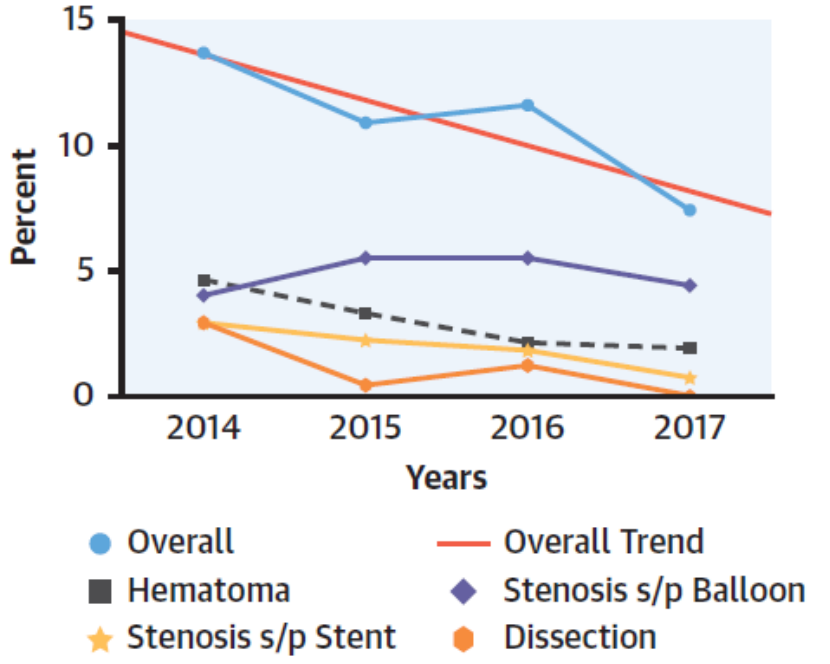
JACC: Cardiovascular Interventions

Unilateral Access Is Safe and Facilitates Peripheral Bailout During Transfemoral-Approach Transcatheter Aortic Valve Replacement

- 1208 TF TAVR patients
- 201 (16.4%) unilateral approach
- No difference in vascular complications
- Facilitates “all sheaths out” approach







Khubber et al. 2019;12:2210-20

Routine Left Ventricular Pacing for Patients Undergoing Transcatheter Aortic Valve Replacement

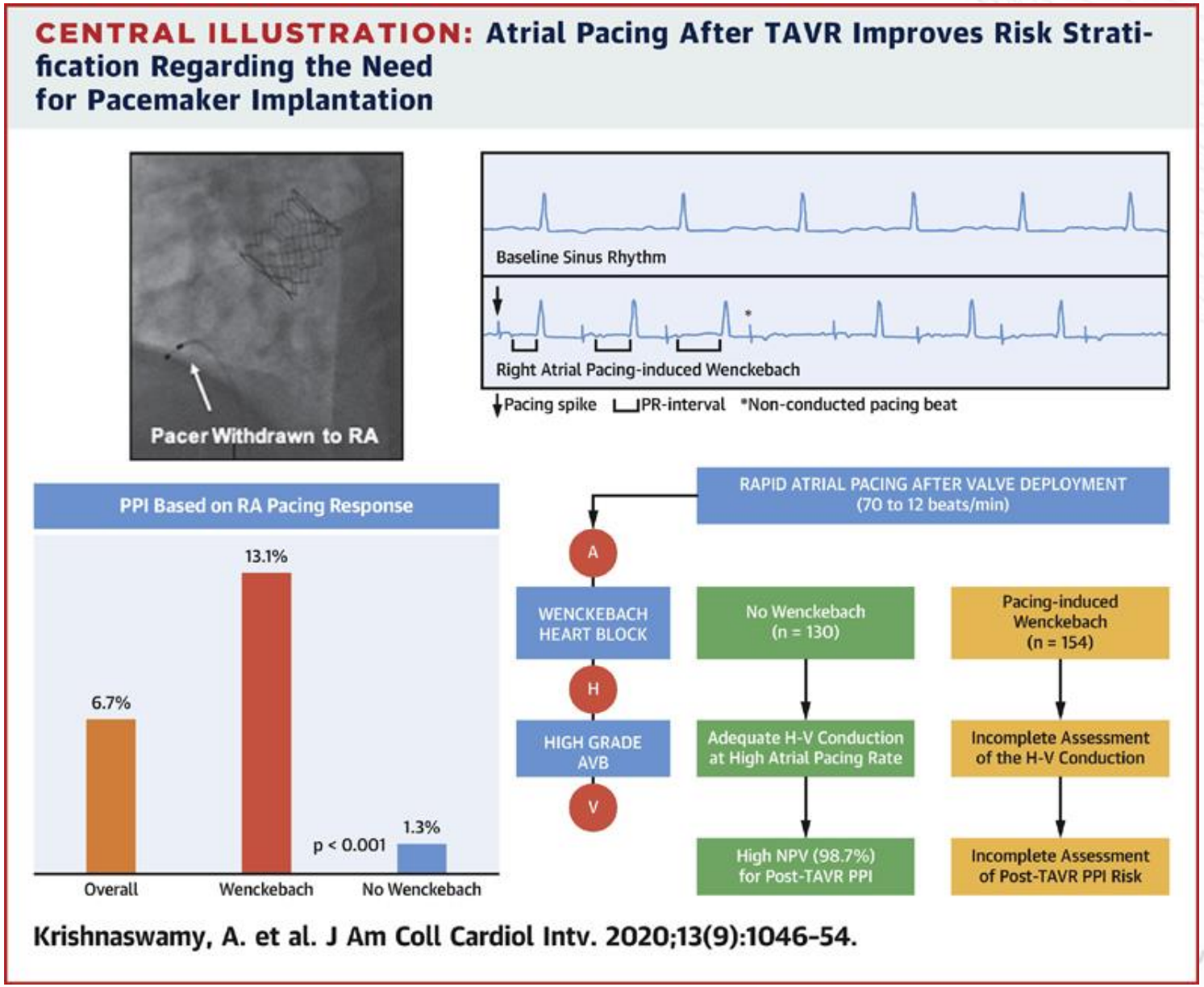
- 226 TF TAVR patients
- 99% underwent LV guidewire pacing
- 0.9% LV perforation
- 7.6% required RV pacing post-TAVR

Scarsini et al. 2019;3:478-82

The Utility of Rapid Atrial PacingImmediately Post-TAVR to Predict the Need for Pacemaker Implantation

- 284 TAVR patients
- Stepwise RA pacing (70-120 bpm) in attempt to induce Wenckebach

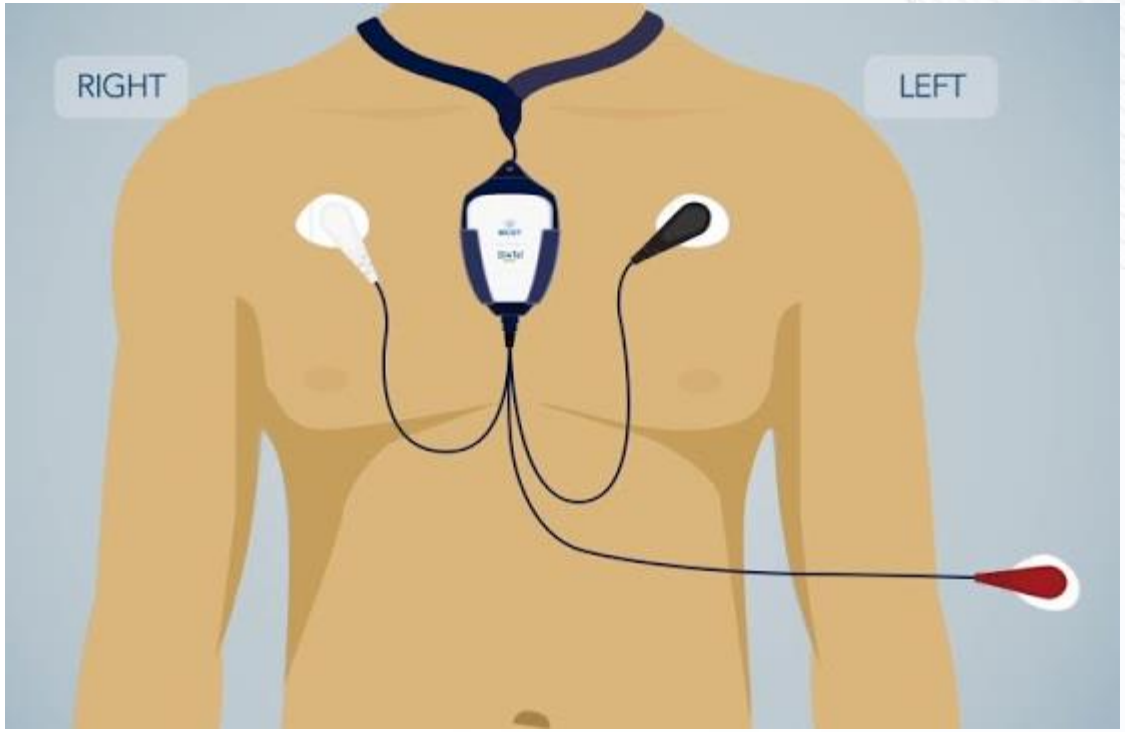
- If no Wenckebach, very low rate of PPM



Mobile Cardiac Outpatient Telemetry (MCOT)

- ~15% (60% brady/heart block, 40% A-fib) abnormal monitor before TAVR
- 9% of those monitored post-TAVR have shown high grade / complete heart block

- If worried about conduction before or after TAVR, consider MCOT

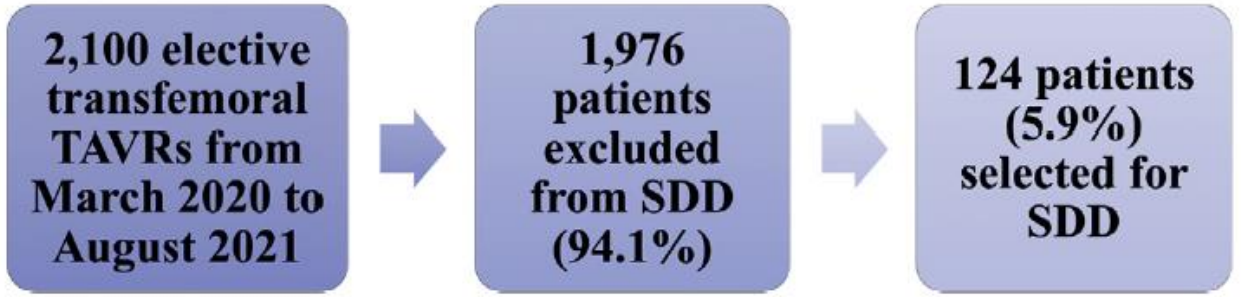


Mutnane-Carol et al. *JACC* 2021;77:1344-56

JACC: Cardiovascular Interventions

Same-Day Discharge Post–Transcatheter Aortic Valve Replacement During the COVID-19 Pandemic

The Multicenter PROTECT TAVR Study



- 2100 TF TAVR patients at 7 centers
- 124 (5.9%) TAVR by noon → SDD
- 78 y/o, STS 2.4%, 32.3% had PPMs
- 1 (0.8%) with CHB got PPM (and went home)

- 30d CV death/stroke/MI/rehospitalization/vascular injury/new PPM

  5.7% (6 out of 106)

Barker et al. 2022;15:590-98

Northwestern Same Day Discharge Algorithm

Pre-Procedure	Procedural	Post-Procedural	Post-Discharge
- Low risk (STS <3%) - Planned transfemoral - Social support (family member to stay) - First or second case - 15 minutes to nearest hospital - Normal EKG (no RBBB) or have PPM - Able to return to clinic next day - Patient agreeable	- Transfemoral (ipsilateral if possible) - MAC/conscious sedation - Remove all sheaths/ hemostasis - No conduction disturbance (new LBBB, CHB) - No procedural complications - +/- Atrial pacing	- Admit to Stepdown - Telemetry for 6 hours - EKG upon arrival to room and at 4 hours (no new LBBB, AV block etc.) - Monitor hemostasis - Neuro checks - Walk within 4 hours - Echo at hour 4 for gradient	- Given on-call number - Follow up visit on post-procedure day #1 - Phone check-ins with Valve team - Standard follow up
IDENTIFICATION	***IMPLEMENTATION***	***CONFIRMATION***	***FOLLOW-UP***

TAVR – Best Practices for an Early Discharge

Pre-procedure:

Consider MCOT if at high risk of heart block post-TAVR

Percutaneous transfemoral access and closure is preferred

Coronary CTA in lieu of invasive angiography to rule out significant CAD

Discharge planning should be complete before the procedure date

Patients identified as eligible for same day discharge should be scheduled for early in the day (and family should be prepared)

TAVR – Best Practices for an Early Discharge

Intra-procedure:

Conscious sedation or Monitored Anesthesia Care (MAC)

Avoid extraneous vascular lines (e.g. radial arterial line)

Routine pre-TAVR balloon aortic valvuloplasty is not recommended

Aortography can be used in lieu of echocardiography

Pacing: Consider LV pacing, using existing PPM and post-implant stepwise RA pacing to assess integrity of AV node

Remove all vascular sheaths (unilateral access when feasible)

TAVR – Best Practices for an Early Discharge

Post-procedure:

For complete heart block with low likelihood of conduction recovery, immediate permanent pacemaker should be considered

The ICU should only be used post-TAVR for select patients

Ambulation as early as possible

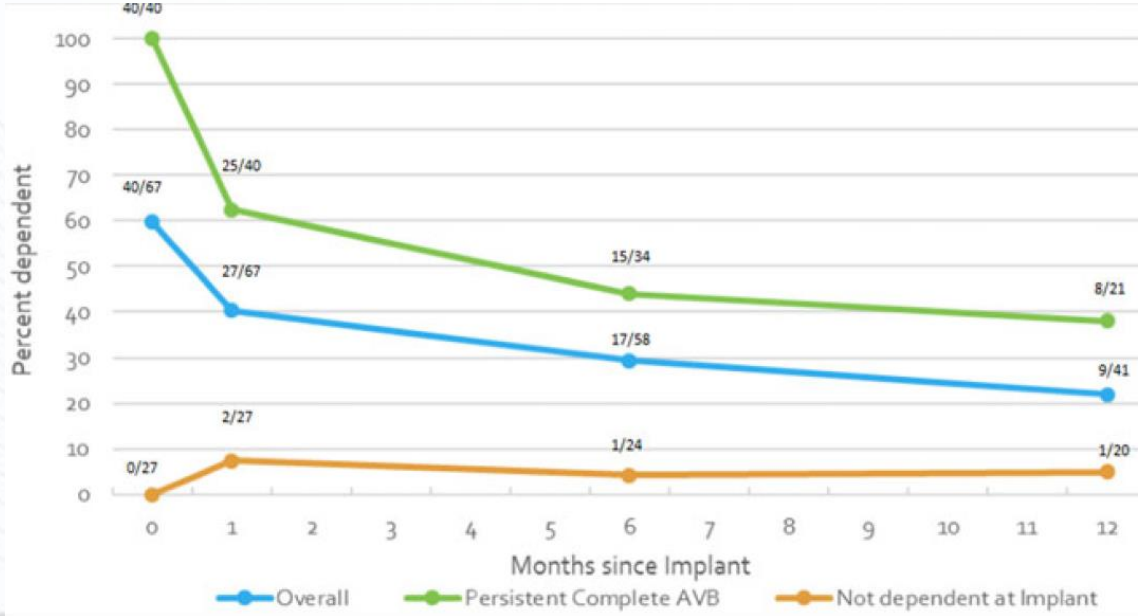
Pre-discharge echocardiography can be done shortly after the procedure

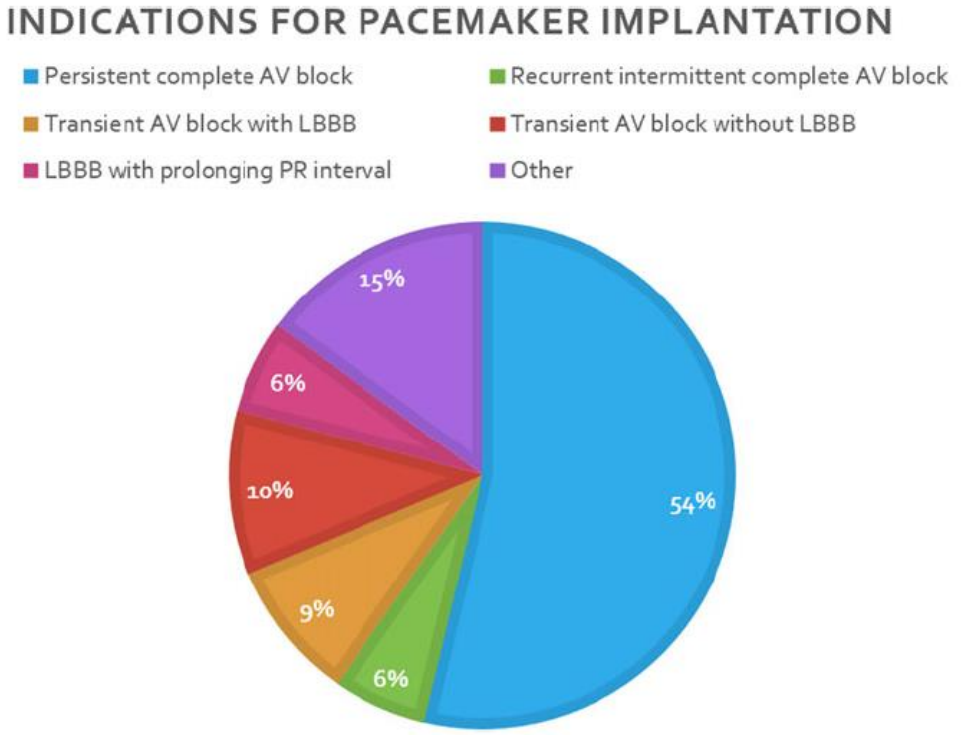
Consider an MCOT for new conduction abnormalities in those otherwise eligible for an early discharge

Conduction recovery following pacemaker implantation after transcatheter aortic valve replacement

PACE

- 594 consecutive TAVR patients w/o a PPM
- 67 (13.%) received a PPM post-TAVR
- PPM dependency = AV block with escape ≤40 bpm
- Dependency 40.3% at 30 d, 21.9% at 1 year
- Self-expanding TAVR valve and persistent CHB were predictive of dependency



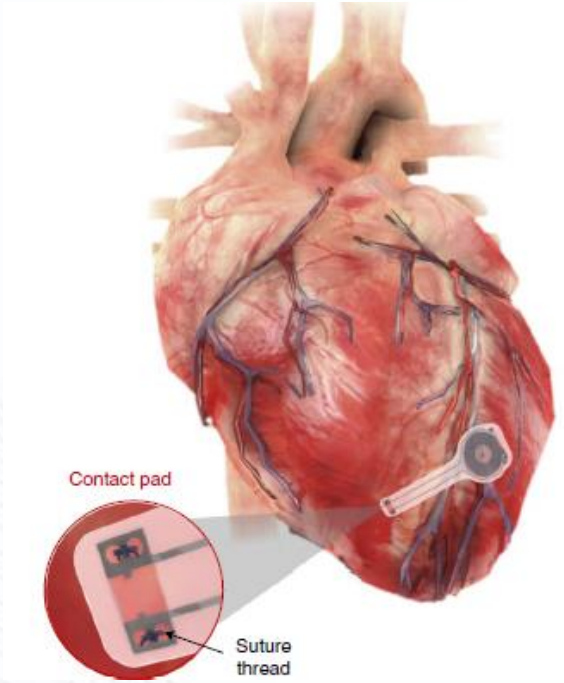


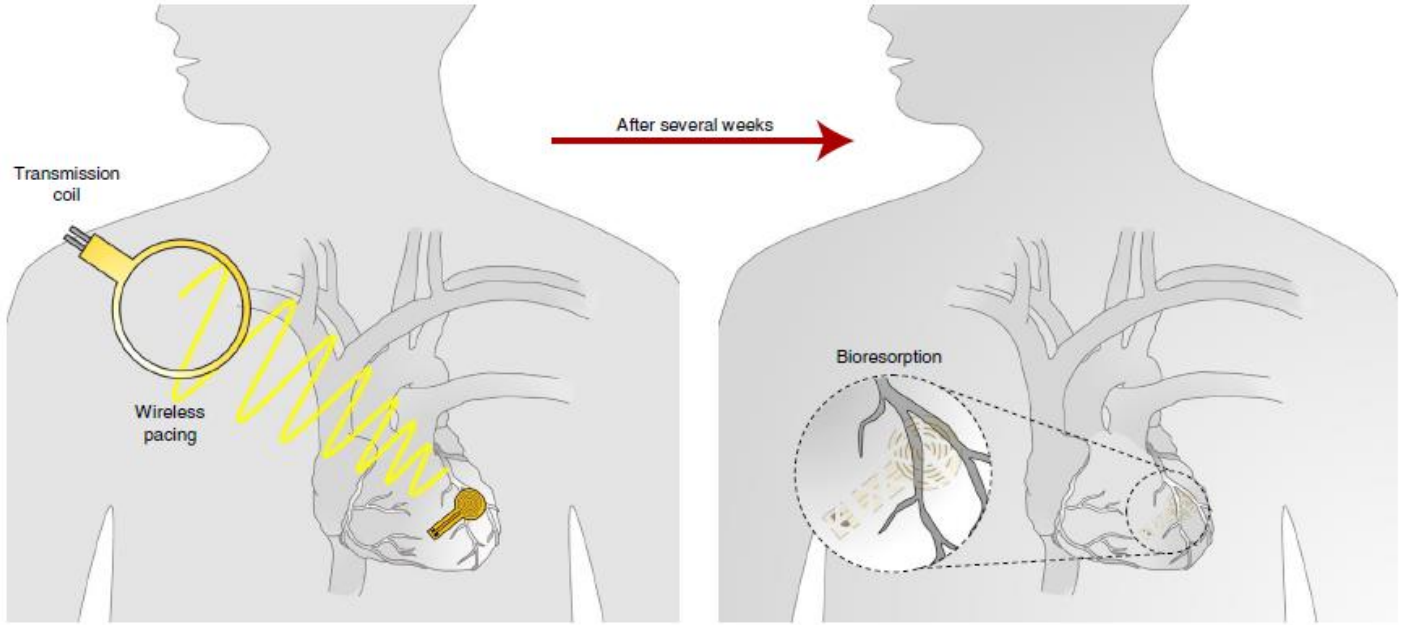
Kaplan et al. 2019;42:146-52

Fully implantable and bioresorbable cardiac pacemakers without leads or batteries

nature biotechnology

- Designed to replace surgical pacing wires
- Could have a future post-TAVR





Choi et al. 2021;39:1228-38

Conclusions

- TAVR, especially from the transfemoral route, has become a routine outpatient procedure
- Pre-TAVR planning and intra-procedures techniques have improved safety and dramatically reduced procedure times
- Next day discharge is now very common and, in selected patients, same day discharge can be considered
- Practice standardization via institutional protocols helps facilitate minimalist TAVR and early discharge