Transcatheter Tricuspid Valve Repair

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Disclosures

- Medtronic - Surgical Advisory Board, Speaker, Proctor
- Boston Scientific - Advisory Board, Speaker
- Edwards Lifesciences – Speaker, Proctor
- Zimmer-Biomet – Speaker
The Forgotten Valve
No More!
Impact of Tricuspid Regurgitation on Long-Term Survival

• Estimated that 80-90% of normal individuals have some degree of TR

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• 5,223 Veterans, echocardiogram at 1 of 3 VAMC

• 4 year follow up

Tricuspid Regurgitation: Not a benign disease

Figure 1. Kaplan–Meier survival curves for all patients with tricuspid regurgitation (TR). Survival is significantly worse in patients with moderate and severe TR.

63% Survival at 1 year for Severe TR

Impact of Tricuspid Regurgitation on Long-Term Survival

- 5,223 Veterans, echocardiogram at 1 of 3 VAMC

- Findings:
  - 63% 1-year mortality if severe TR
  - Controlled for LVEF <50% and/or pulmonary hypertension – Moderate or Greater TR still had worse outcomes

Transcatheter Tricuspid Valve Repair

The Next Frontier
Transcatheter Tricuspid Valve Repair

The Next Frontier
Transcatheter Tricuspid Valve in Ring
Transcatheter Tricuspid Valve in Ring
Transcatheter Tricuspid Valve in Valve
Transcatheter Tricuspid Valve in Valve
Transcatheter Tricuspid Valve in Valve
Transcatheter Tricuspid Valve in Valve
TAVR in IVC
“CAVI”
TAVR in IVC – AKA “CAVI”
TAVR in IVC – AKA “CAVI”

29mm Edwards Sapien XT
MitraClip in Tricuspid
MitraClip in Tricuspid
MitraClip in Tricuspid
MitraClip in Tricuspid -Aborted
Trialign
Trialign – Mitralign, Inc.

- Percutaneous TV annuloplasty technique to reduce TV annular dilation in functional TR
- Pledged suture to the posterior portion of the tricuspid annulus via a trans-jugular approach
TriCinch

Rosser et al. EuroIntervention 18, September 2016
TriCinch

• Address annular dilation to address severe TR
• Reduction of severe (4+) to moderate (2+) at six-month follow up

Rosser et al. EuroIntervention 18, September 2016
Cardioband
Edwards TRI-REPAIR

17% average reduction in septolateral diameter
Nickenig TCT 2017 30-Day Outcomes
Edwards TRI-REPAIR

Functional improvement at 30 days
Nickenig TCT 2017 30-Day Outcomes
FORMA
Forma Repair System

- Early Feasibility with the FORMA device – Edwards Lifesciences
- Designed to provide a surface for native leaflet coaptation and reduce TR

Campelo-Parada et al, J Am Coll Cardiol 2015;66:2475–83
Forma Repair System

**CENTRAL ILLUSTRATION** Novel Transcatheter Repair System for Severe Tricuspid Regurgitation: Exercise Capacity and Quality of Life Before and After Device Implantation

Exercise Capacity - 6MWT (m)  
Quality of Life - ICCQ

*Test stopped at 5 minutes for hip pain in one patient

The International Multicenter TriValve Registry

Which patients are Undergoing Transcatheter Tricuspid Repair?

Maurizio Taramasso, MD, a Rebecca T. Hahn, MD, b Hannes Alessandrini, MD, c Azeem Latib, MD, d Adrian Attinger-Toller, MD, e Daniel Braun, MD, a Eric Brochet, MD, d Kim A. Connelly, MD, b Paolo Denti, MD, d Florian Deuschl, MD, d Andrea Englmaier, MD, d Neil Fam, MD, d Christian Frerker, MD, e Joerg Hausleiter, MD, d Jean-Michel Juliard, MD, f Ryan Kaple, MD, d Felix Kreidel, MD, d Karl Heinz Kuck, MD, f Shingo Kuwata, MD, PhD, a Marco Ancona, MD, a Margarita Malasa, MD, a Tamim Nazif, MD, b Georg Nickenig, MD, b Fabian Nietlispach, MD, PhD, a Alberto Pozzoli, MD, a Ulrich Schäfer, MD, a Joachim Schofer, MD, a Robert Schueler, MD, a Gilbert Tang, MD, d Alec Vahanian, MD, a John G. Webb, MD, a Ermela Yzeira, MD, b Francesco Maisano, MD, b Martin B. Leon, MD b
The International Multicenter TriValve Registry

- Largest real life registry of patients treated with transcatheter TV Interventions
  - 106 High Risk Patients, 11 Centers
- Procedural Success 62%
- 30 day all cause mortality 3.7%
The International Multicenter TriValve Registry

- Echo improvement in TR at time of discharge
- 30 day Echo TR ≤2+ in 49%
The International Multicenter TriValve Registry

- At 30 days 59% NYHA I-II
- Promising short-term clinical benefit

**FIGURE 4** NYHA Functional Class at Baseline Compared With 30 Days

- p=0.003
The International Multicenter TriValve Registry

• Initial results suggest that transcatheter tricuspid valve therapy is feasible with different techniques, but clinical efficacy requires further investigation
Pledgets Assisted Suture
Tricuspid Annuloplasty
(PASTA)
Pledgets Assisted Suture Tricuspid Annuloplasty (PASTA)

- Trans-annular pledgeded sutures
- Using marketed devices
- Targets at mid-anterior annulus and posterior-septal annulus.
- Two bites at each annular target
- Goal: Create a double-orifice tricuspid valve

Khan JM et al. CCI 2018
How to do the double orifice valve technique to treat tricuspid valve incompetence

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Abstract

A straightforward tricuspid valve repair technique is illustrated here, which may be employed either for functional (normal valve with dilated annulus) or for primary or organic (Ebstein’s anomaly, leaflet retraction/tethering and chordal malposition/tethering, with annular dilation) tricuspid valve incompetence and for moderate and severe degrees of incompetence, without any residual regurgitation or reoperation. The basic principle is to reduce the distance between the coapting leaflets in a manner in which the most mobile leaflet, which is usually the anterior, could coapt to the opposite leaflet, by creating two orifices, ensuring valve competence. Additionally, it reduces annular dilatation and lessens tricuspid valve leaflet tethering, thereby stabilizing the annulus and increasing leaflet coaptation.
PASTA Procedural Steps

A. Two guidewires sequentially traverse the anterior annular target

B. The guidewires are snare-retrieved and exchanged for sutures

C. Sutures and pledgets are placed at both septal and anterior targets

D. Each suture limb is tightened and secured with a Cor-Knot

Khan JM et al. CCI 2018
PASTA
Transcatheter Tricuspid Valve Repair

Conclusions

• Current transcatheter options for the tricuspid valve remain limited but there are select cases in which current techniques may be beneficial

• Many questions remain

• Dedicated devices and new approaches are needed
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Thank you!
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