Interventionelle Therapieoptionen Trikuspidalinsuffizienz

PD Dr. med. Thomas Nestelberger

30.01.2025

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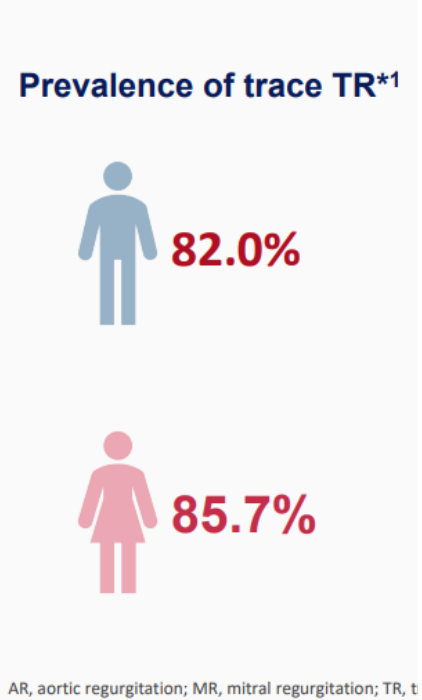
Tricuspid regurgitation is common and undertreated

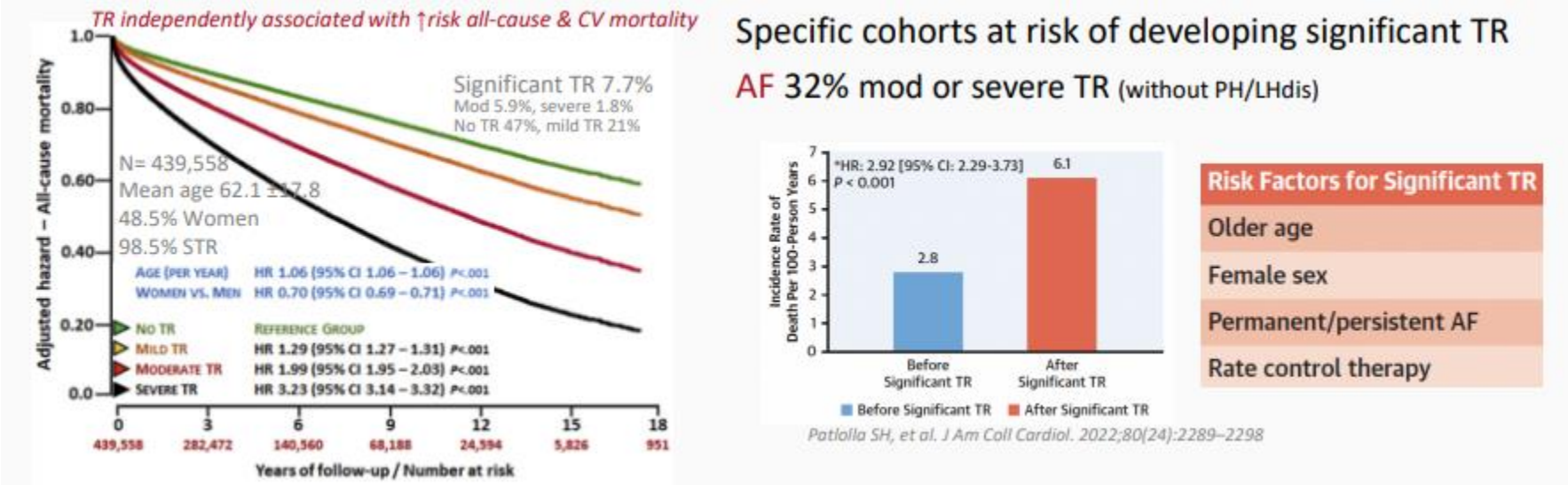


AR, aortic regurgitation; MR, mitral regurgitation; TR, t

*The Framingham study assessed the prevalence and clinical determinants of MR, TR and AR in a population-based cohort. Color Doppler echocardiography was performed in 1,696 men and 1,893 women (aged 54±10 years) attending routine examinations. Multiple logistic regression analysis was used to examine the association of clinical variables with MR and TR (more than or equal to mild severity) and AR (more than or equal to trace severity).

1 Singh JP et al. Am J Cardiol 1999; 2 Stuge O. et al. J Thorac Cardiovasc Surg 2006

Age, female sex and AF are risk factors



- Higher incidence in women Framingham 5.6% versus 1.5%
- Mod to sev TR in 32% among AF patients
- Mod to sev TR in 24% among CIED patients
- TR is associated with heart failure

Patolla SH et al. JACC 2022 and JASE 2022

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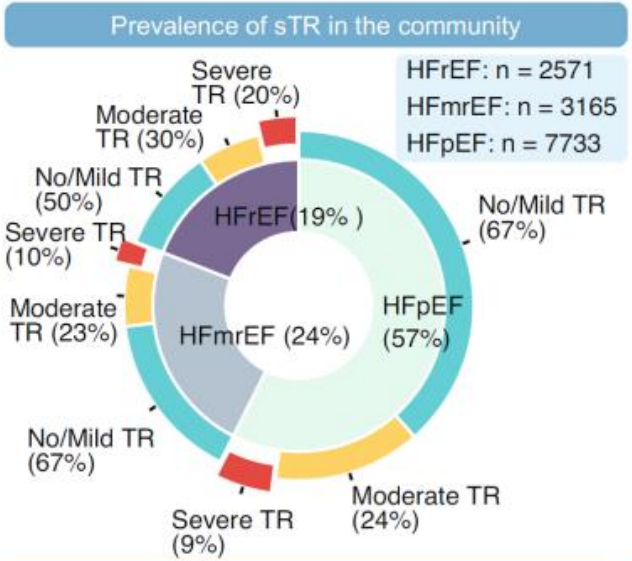
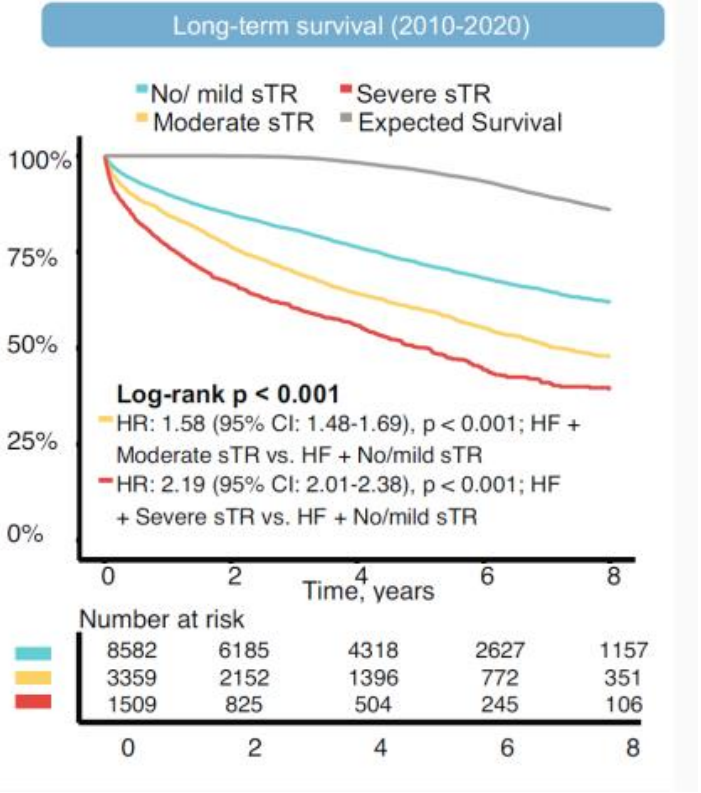
HF patients often have secondary TR





Heitzinger G. et al. Eur J Heart Fail. 2023

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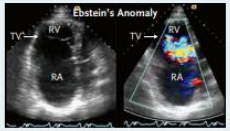
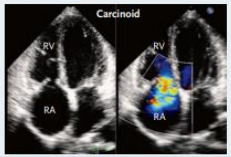
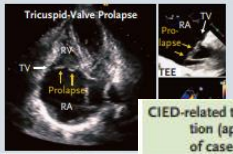
Aetiology

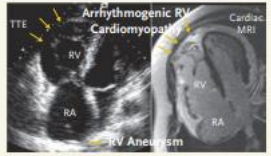
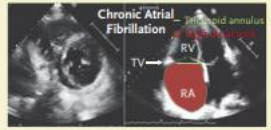
Primary TR 5-10%

Causative Disease Process	Mechanism	Examples
Primary tricuspid regurgitation (5–10% of cases)		
Congenital anomaly	Apical displacement (e.g., Ebstein's anomaly) or leaflet defect (e.g., AV canal or tricuspid hypoplasia)	
Infection	Endocarditis	
Infiltrative process	Leaflet infiltration (due to tumor, carcinoid, or drugs) or fibrosis (due to rheumatic disease or radiation-related valvulopathy)	
Degenerative disease	Prolapse or flail leaflet	
Trauma or iatrogenic cause	Leaflet avulsion or damage (from trauma, biopsy, or lead extraction)	

CIED 10-15%

CIED-related tricuspid regurgitation (approximately 10–15% of cases)		
Lead-related tricuspid regurgitation	Causative: leaflet impingement, perforation, or valvular or subvalvular adhesions or restriction	
	Incidental: presence of CIED without interference in valvular apparatus	

Secondary TR 10-15%

Causative Disease Process	Mechanism	Examples
Secondary tricuspid regurgitation (approximately 80% of cases)		
Ventricular secondary tricuspid regurgitation	Postcapillary PH due to left ventricular disease (HFpEF or HFrEF) or left valvular disease	
	Precapillary PH due to primary pulmonary arterial or pulmonary parenchymal disease (e.g., PAH, chronic lung disease, or CTEPH)	
	Primary RV dysfunction or remodeling (due to RV infarct or RV cardiomyopathy)	
Atrial secondary tricuspid regurgitation	RA or TA dilatation (related to age, atrial fibrillation, or HFpEF)	

Hahn RT et al. NEJM 2023

Tricuspid valve anatomy

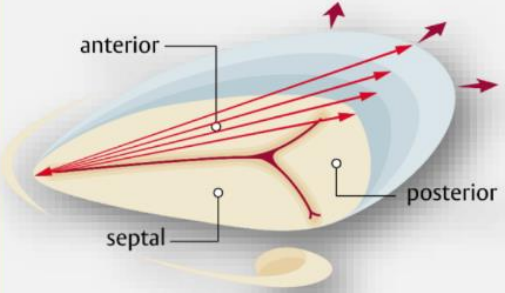
Dense Chordae

- High variability of chordae: quantity, density, and location[1,2]
- Thin and fragile chordae[1]

Thin and Variable Leaflets

- Thin, translucent, and more delicate leaflets[1,2]
- Usually 3 leaflets, but variable or with deep clefts and folds[2,3]

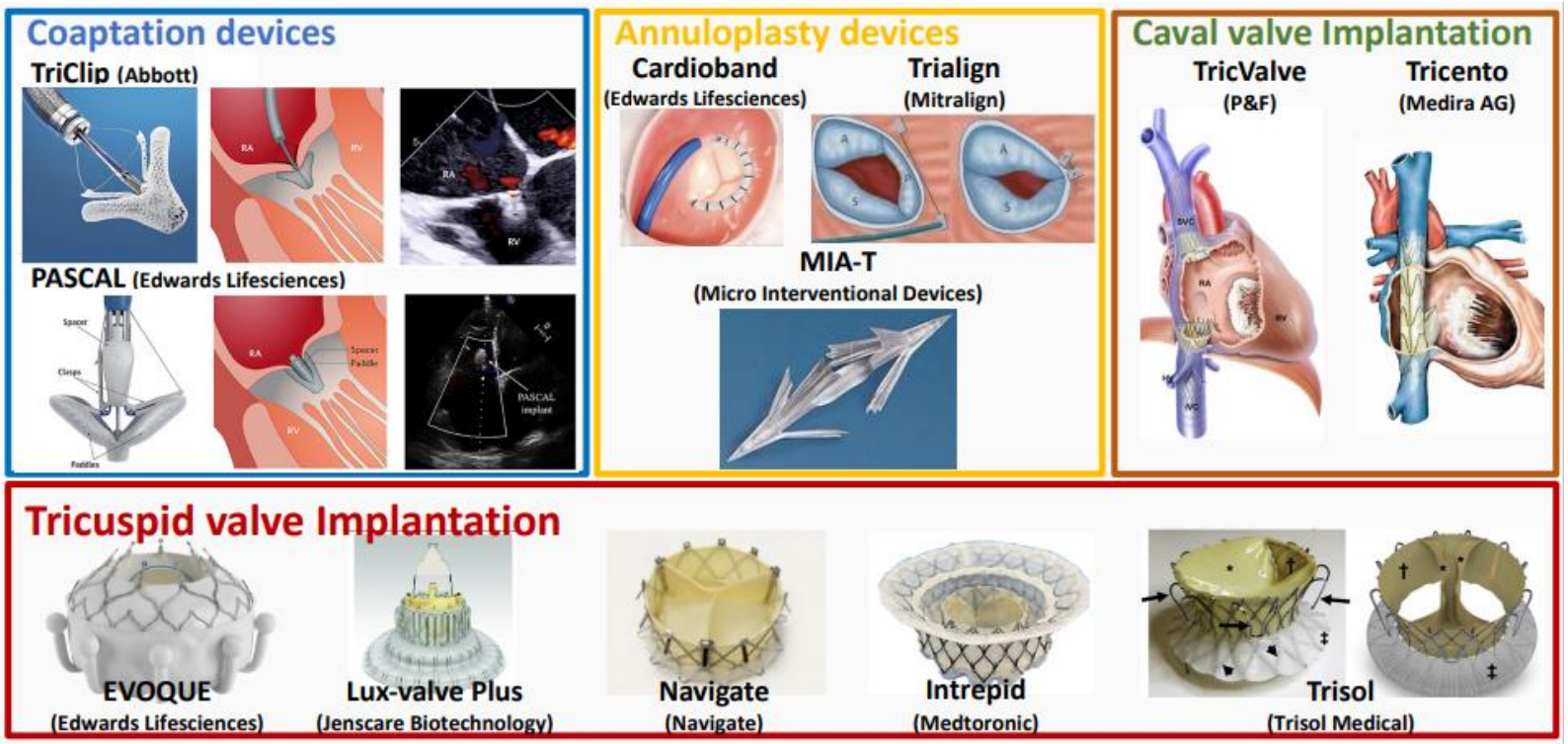
Large Annulus



- Tricuspid valve has the largest annulus[4]
- 90% of TR is Functional TR (FTR), presenting with annular dilatation[5]

1Pozzoli A, et al. Frontiers in Cardiovascular Medicine. 2018; 5. 1-9 ; 2 Dahou A, et al. JACC, 2019; 12: 458-68 ; 3 Athavale S, et al. Anat Cell Biol, 2017;50:1–6; 4 Tornos Mas P, et al. Heart. 2015; 101: 1840–1848 ; 5 Arsalan M, et al. Eur Heart J. 2017 Mar 1, 38; 634-638

Transcatheter tricuspid valve interventions



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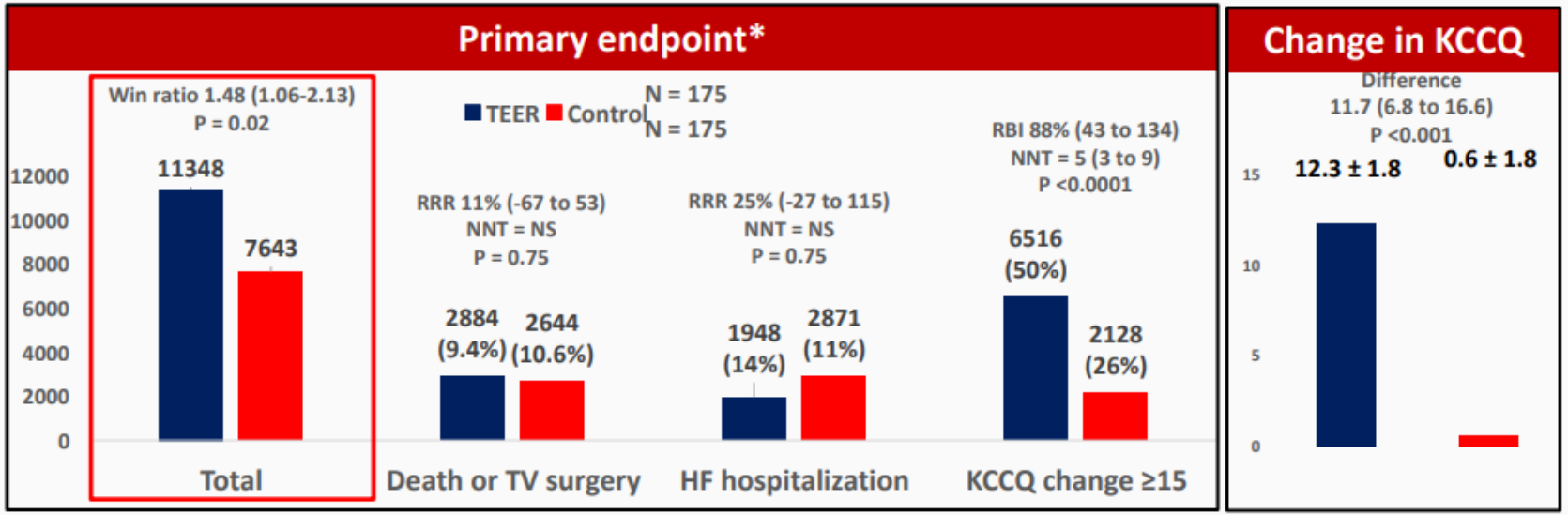
Triluminate Trial



Primary endpoint: Composite of mortality, TV surgery, HF hospitalization, and KCCQ improvement ≥15 points at 12 months F/U derived by Finkelstein-Schoenfeld Analysis (first 350 patients):

Under the assumption of a 1-year incidence of death or tricuspid-valve surgery of 15% in the TEER group and 20% in the control group, an annualized rate of hospitalization for heart failure of 0.35 events per patient-year and 0.50 events per patient-year, respectively, and an improvement in the KCCQ score of at least 15 points from baseline occurring in 45% of the patients in the TEER group and in 20% of the patients in the control group, a sample of 350 patients was derived to provide 84% power and to show superiority of TEER to the control, with a two-sided alpha level of 0.05.

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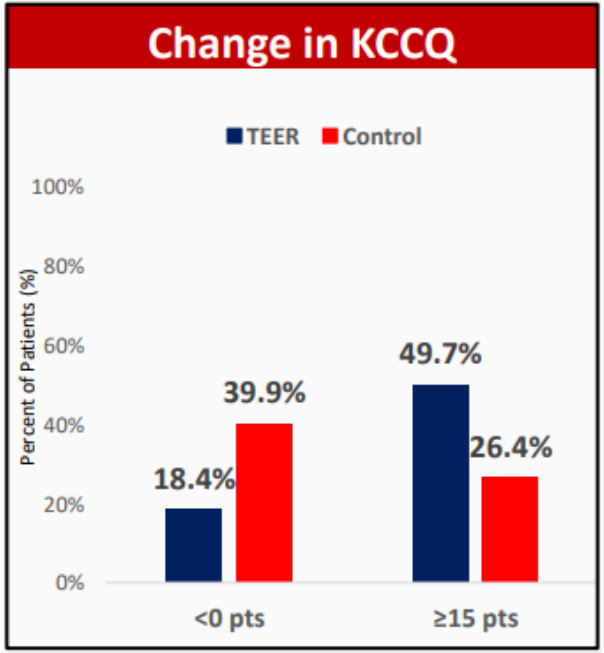
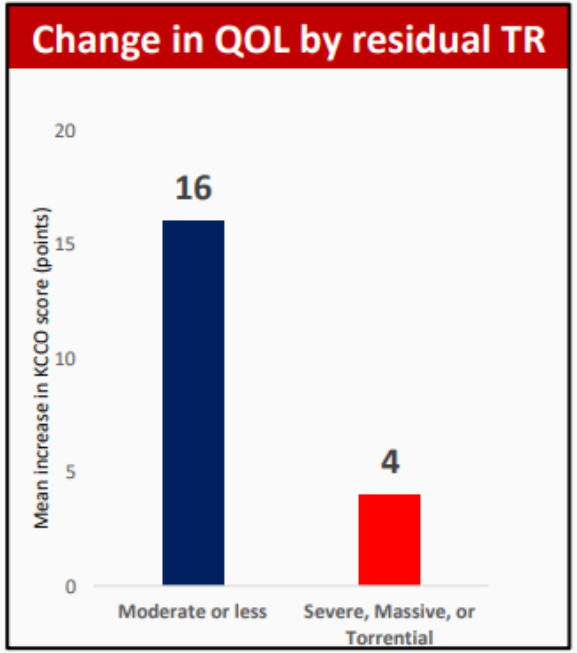
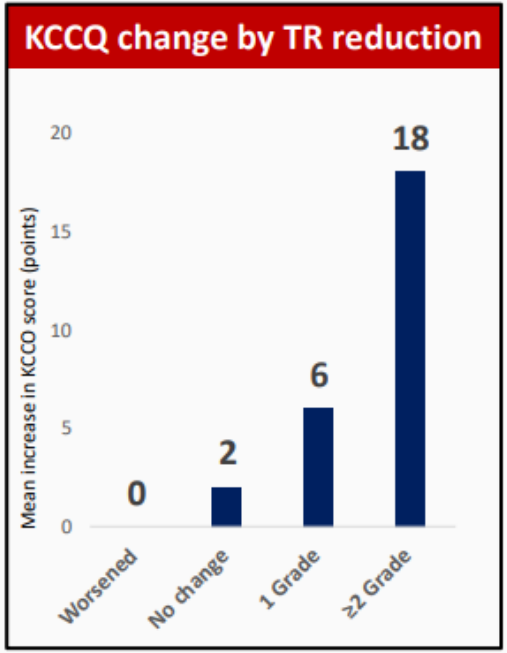
Triluminate Trial







✓ *TriClip therapy demonstrated superiority to medical therapy driven mainly by significant improvement in QOL.*

✓ *Degree of TR reduction was related to degree of improvement in QOL.*

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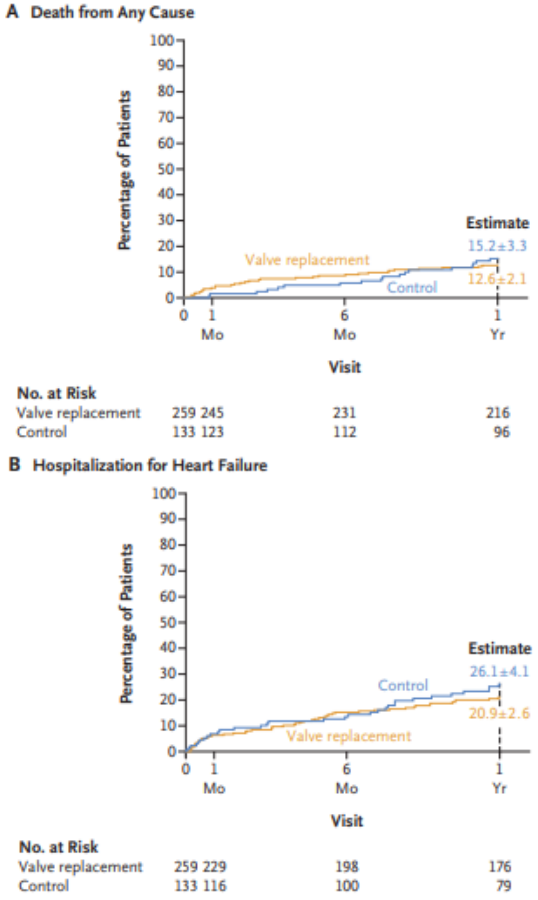
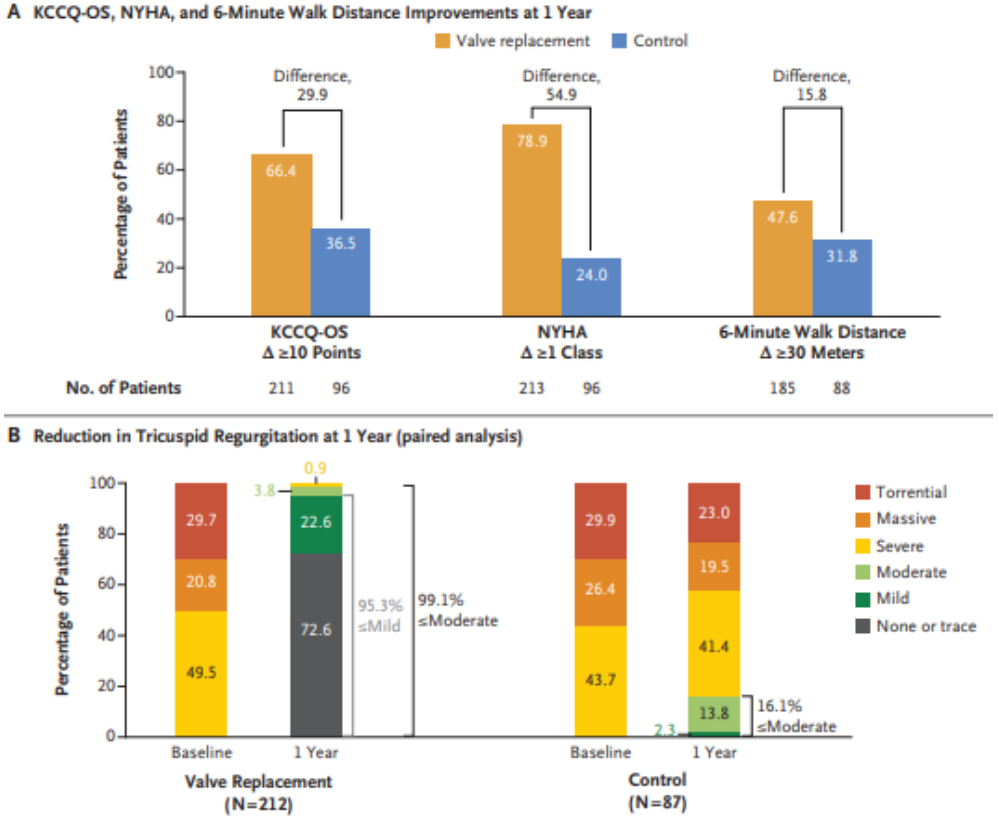
Triscend II Trial





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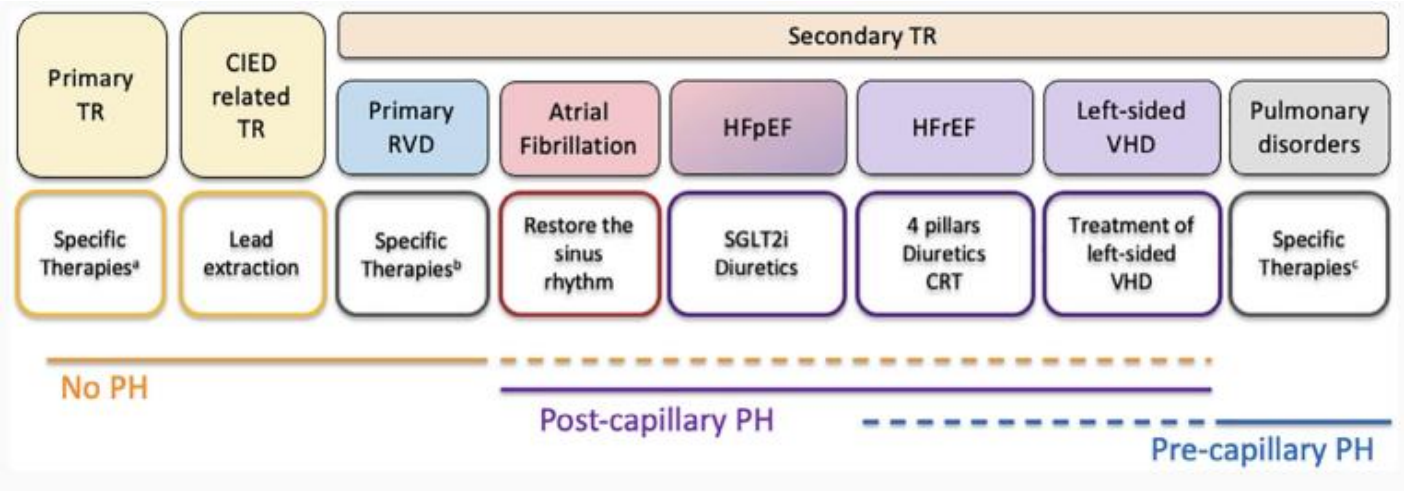
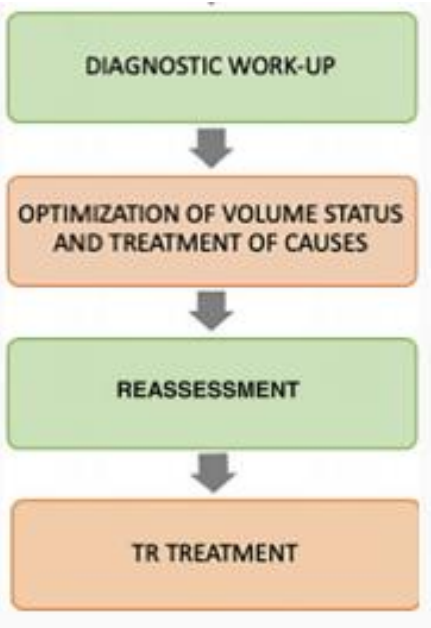
TR is a common phenotype of HFpEF





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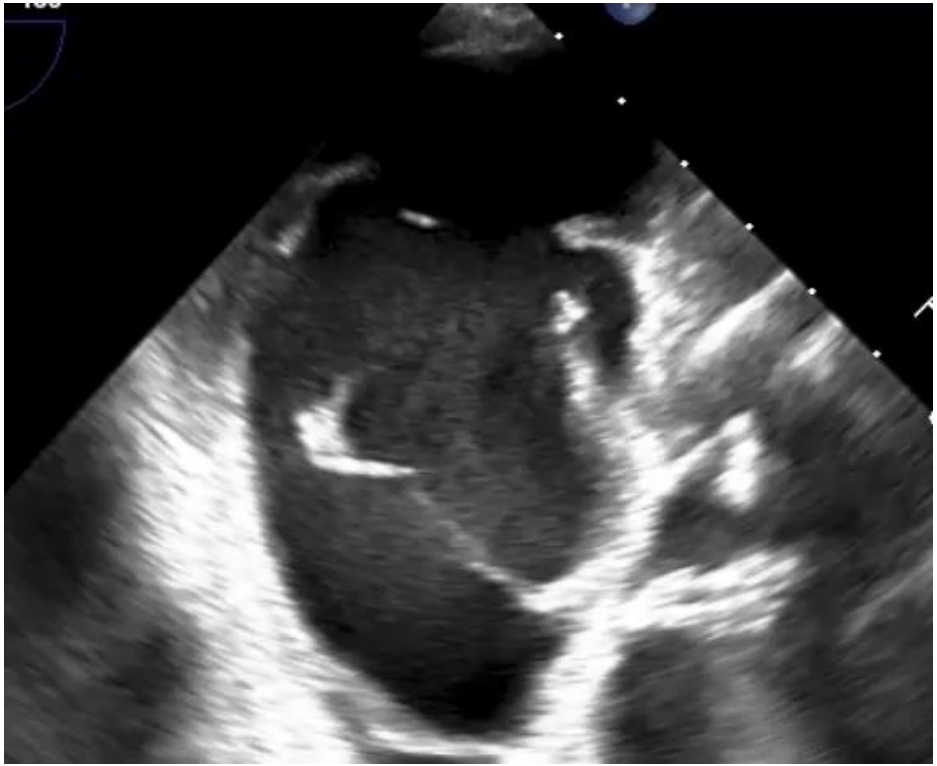
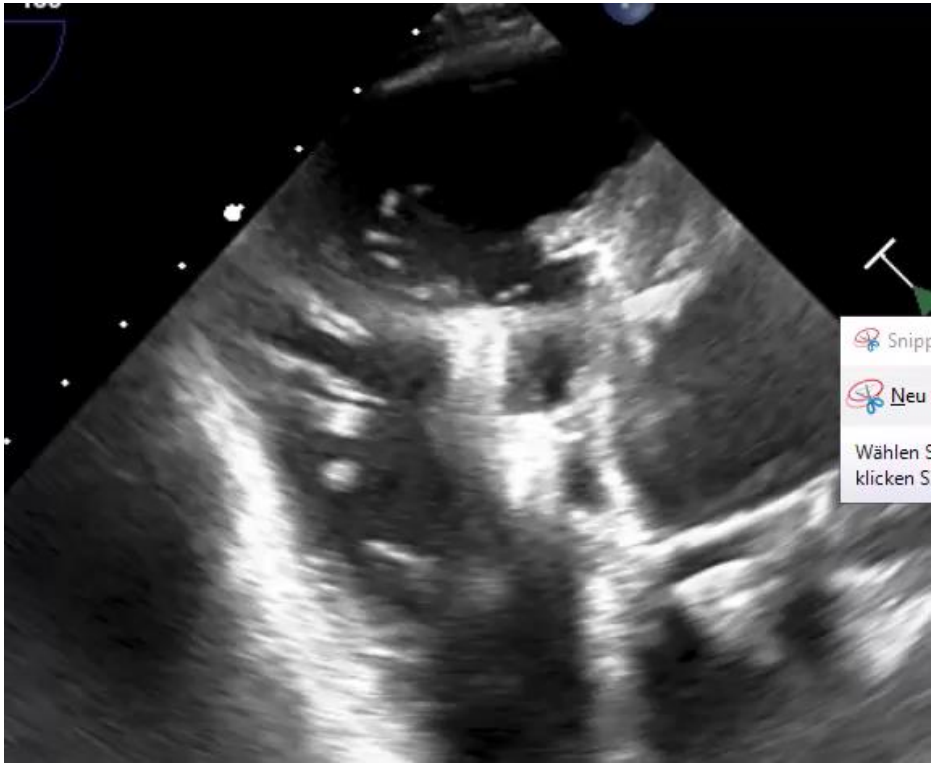
Ongoing Trials

Clinical Trial	N	Intervention	Primary outcome	Follow-up period	Estimated study Completion
CLASP II TR (NCT04097145)	870	PASCAL + OMT vs. OMT (1:1)	Composite of all-cause mortality, RVAD implantation/heart transplant, TR intervention, HF hospitalizations, and KCCQ improvement	24 months	2024
TRI.Fr (NCT04646811)	300	TriClip + OMT vs. OMT (1:1)	Composite clinical endpoint combining NYHA class, patient global assessment (PGA), and major cardio-vascular events	12 months	2024
TRIC-I-HF (NCT04634266)	360	TEER or TTVA + OMT vs. OMT (2:1)	All-cause mortality or heart failure hospitalization	12 months	2026
TRACE-NL (NCT05628779)	150	TriClip or PASCAL + OMT vs. OMT (2:1)	Composite of all-cause mortality, heart failure hospitalization and Quality of Life	12 months	2027
TRISCEND II (NCT04482062)	400	EVOQUE + OMT vs. OMT (2:1)	TR grade reduction and composite of KCCQ, NYHA, and 6MWD improvement	6 months	2024
			MAE at 30 days	1 month	
			Composite of all-cause mortality, RVAD implantation/heart transplant, TV intervention, HF hospitalizations, KCCQ, NYHA, and 6MWD improvement	12 months	
TRICAV-II (NCT06458907)	600	TricValve + OMT vs. OMT	CV mortality	12 months	2030
NCT04339192	330	Minimally invasive surgery vs. OMT	Composite of all-cause death, re-hospitalization due to right heart failure or both of them	24 months	2024

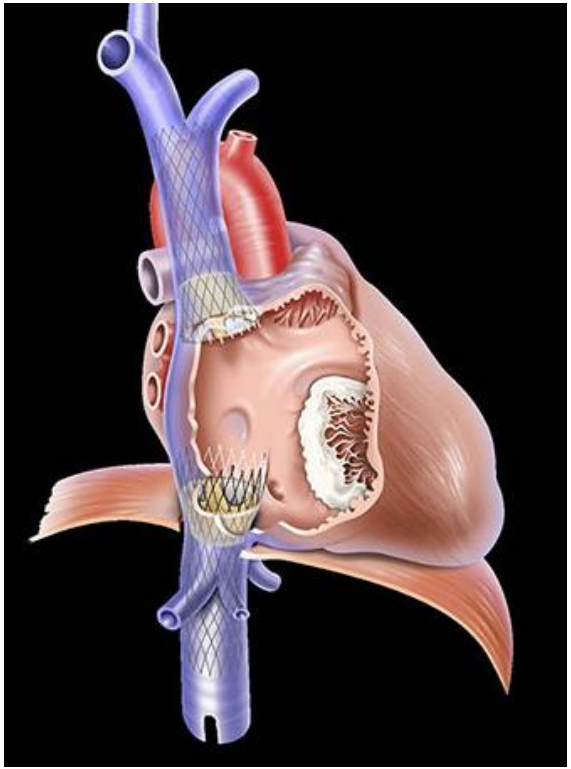
Case Triclip

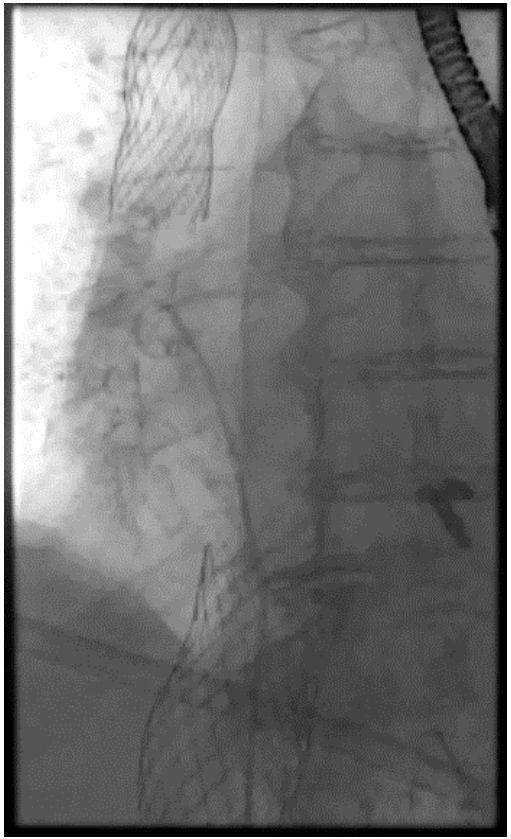




Case Triclip

Case Tricvalve





Managment Algorithm for Tricuspid regurgitation

Potential to improve is limited!

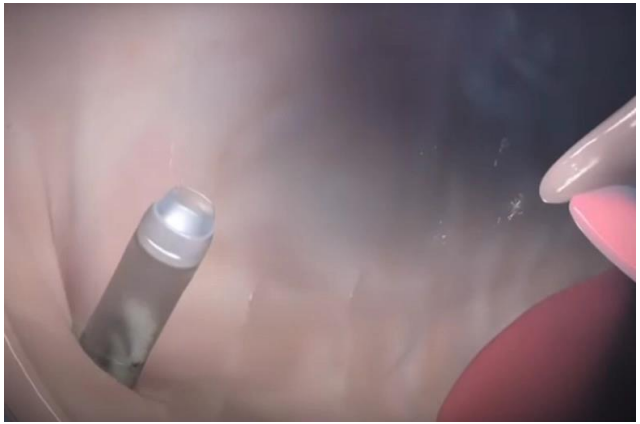
Symptomatic burden

Potential to improve

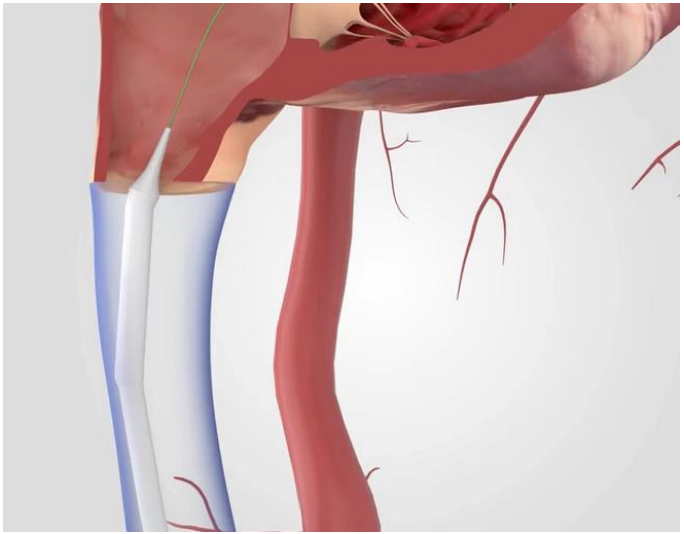
	➢ No left-sided heart failure ➢ Normal end-diastolic pressures ➢ Normal right heart function	➢ Heart failure with preserved ejection fraction ➢ Heart failure with recovered ejection fraction ➢ Heart transplant recipients ➢ Concomitant left sided valvular heart disease ➢ Incipient impaired right heart function	➢ Heart failure with reduced ejection fraction ➢ Terminal heart failure ➢ Left ventricular assist devices ➢ Untreated left-sided valve disease ➢ Terminal right heart failure
	➢ Normal pulmonary artery pressures ➢ No pulmonary fibrosis ➢ No restrictive or obstructive pulmonary disease	➢ Isolated postcapillary pulmonary hypertension ➢ Mild to moderate pulmonary fibrosis ➢ Mild to moderate restrictive or obstructive pulmonary disease	➢ Combined postcapillary or precapillary pulmonary hypertension ➢ Severe pulmonary fibrosis ➢ Severe restrictive or obstructive pulmonary disease
	➢ Normal renal function (eGFR >60 ml/min/1.73m²)	➢ Impaired renal function ➢ Renal transplant recipients	➢ Severely impaired renal function ➢ Chronic renal failure requiring dialysis
	➢ No liver fibrosis ➢ Normal liver synthesis function ➢ No symptoms attributable to liver failure	➢ Liver fibrosis (Child Pugh Class A) ➢ Increased circulating liver enzymes ➢ Liver transplant recipient	➢ Manifest liver cirrhosis (Child Pugh Class B&C) ➢ Coagulopathy due to liver disease ➢ Hepatic encephalopathy
	➢ Ability to fulfill work tasks of daily routine ➢ Good subjective physical, psychical and social quality of life	➢ Impaired ability to fulfill work tasks of daily routine ➢ Impaired subjective physical, psychical and social quality of life	➢ Mobility dependent on second persons help ➢ Terminal co-morbidity limiting life expectancy <1 year

Interventional Treatment options

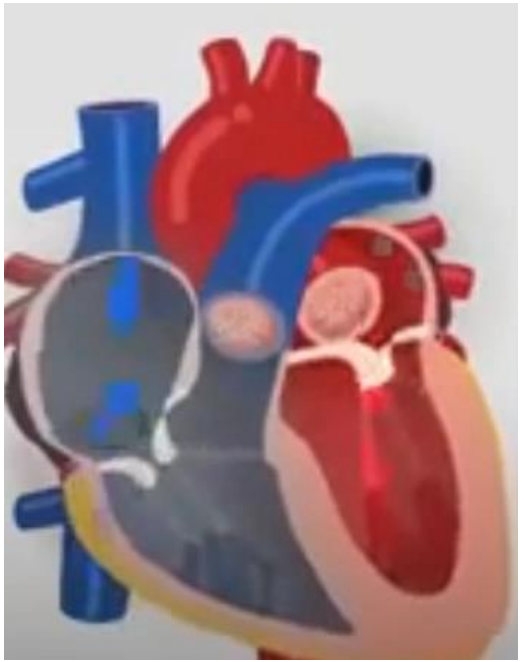
Triclip/PASCAL



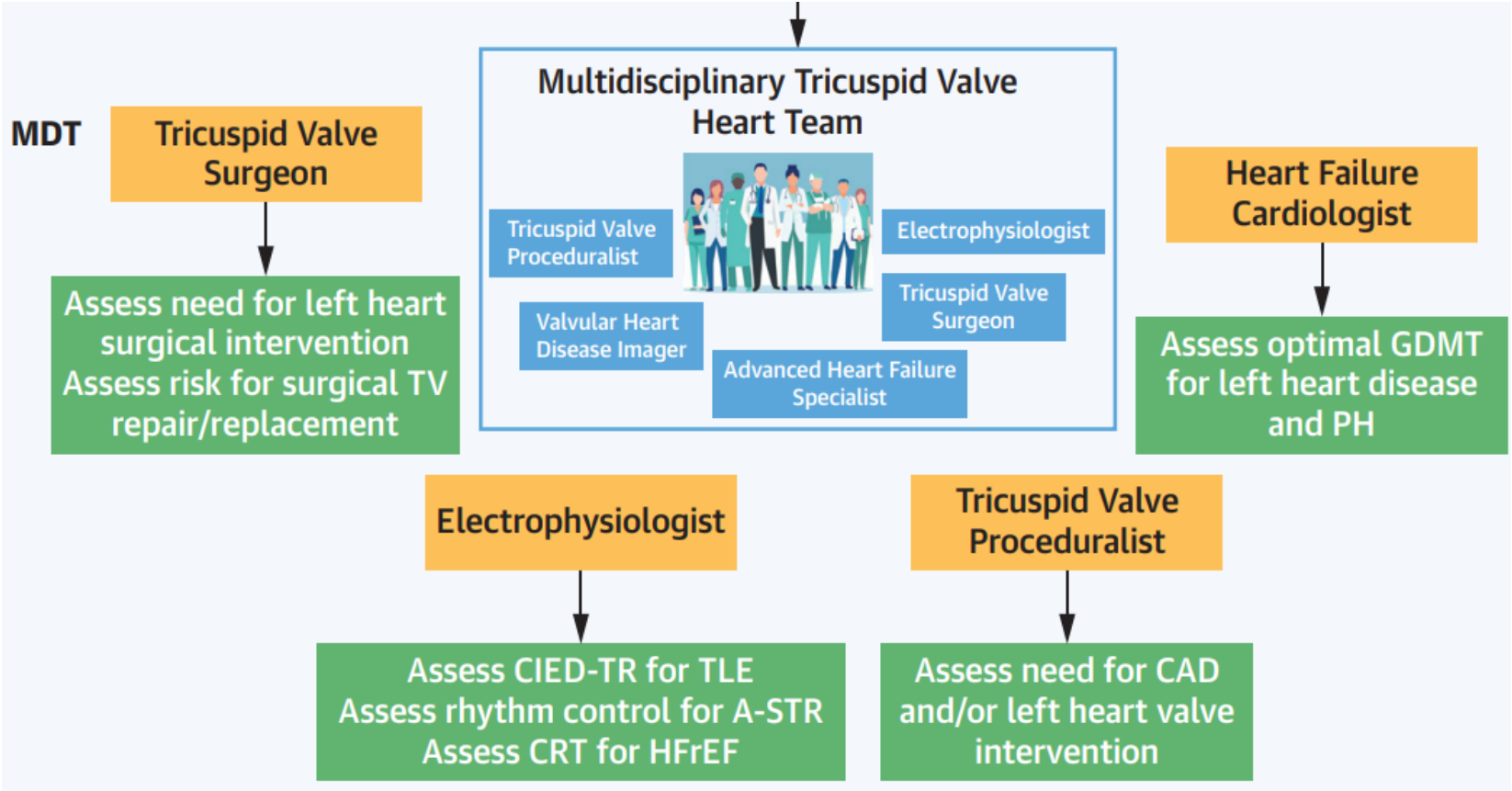
Evoque



Tricvalve



Heart Team



Hahn RT et al. JACC Heart failure 2023

Take Home Messages

- ✓ Tricuspid regurgitation impacts mortality independent of pulmonary pressure, LV or RV dysfunction
- ✓ Optimize medical therapy, treat concomittant diseases
- ✓ Refer patients with secondary TR not too late for interventions
- ✓ TEER became successful and effective treatment option
- ✓ TTVR (Evoque) is becoming a new tool for TR in addition to TEER
- ✓ Future studies for TEER/TTVR are ongoing

Multidisciplinary Heart Team

Virtual Heart Team

Nehmen Sie auf dem Computer, in der mobilen App teil

Hier klicken, um an der Besprechung teilzunehmen

Besprechungs-ID: 361 309 179 436

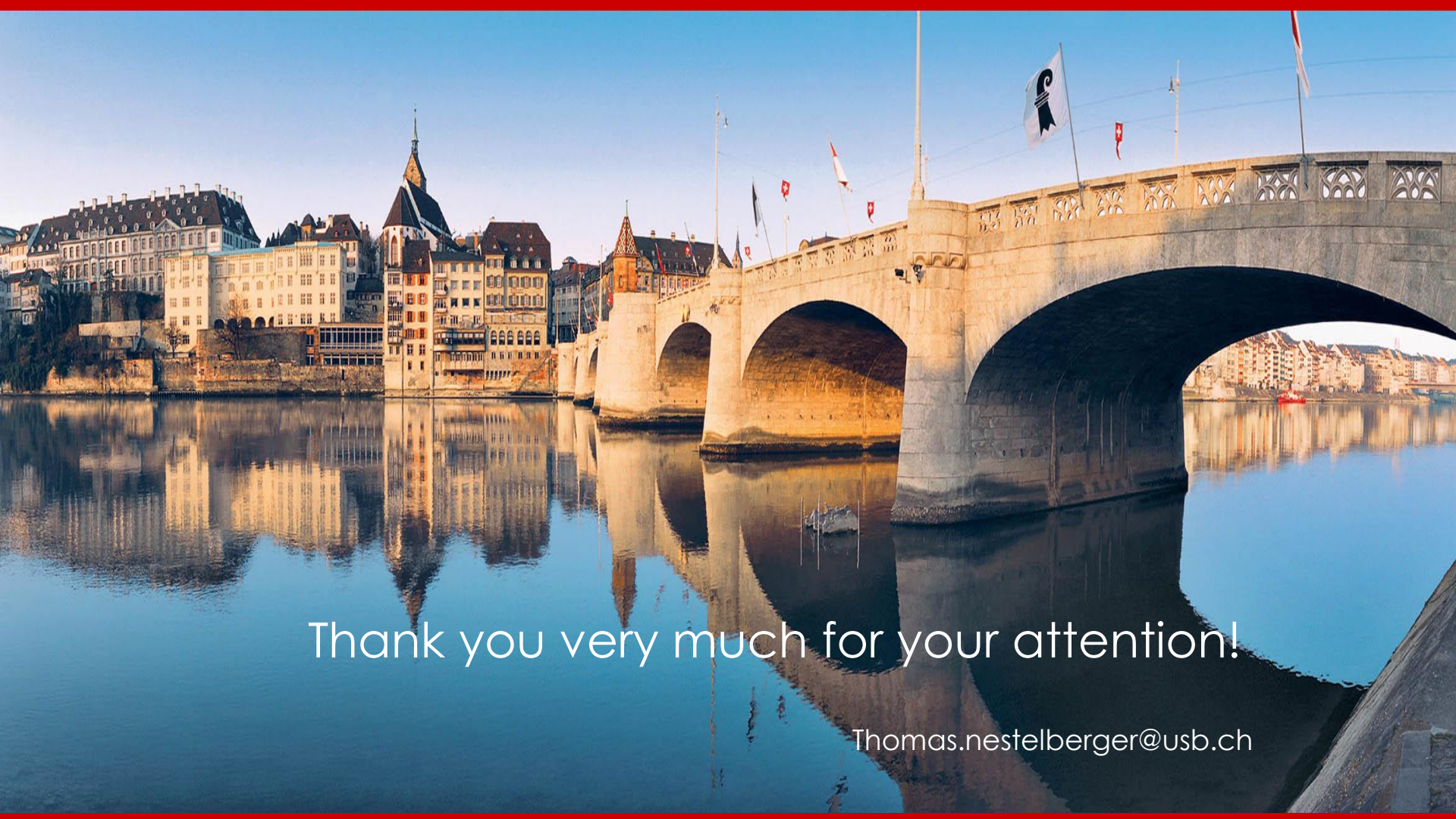
Passcode: BKVRP9

Teams herunterladen | Im Web beitreten

MO MI FR ab 16:45 Uhr

Heart Team Sprechstunde

- 1x/Woche, interdisziplinär OA Herzchirurgie und mind. 2x OA Kardiologie (Interventionell und Imaging), OA Anästhesie
- Anmeldungen an herzzentrum@usb.ch oder heartteam.kardiologie@usb.ch


Thank you very much for your attention!
Thomas.nestelberger@usb.ch

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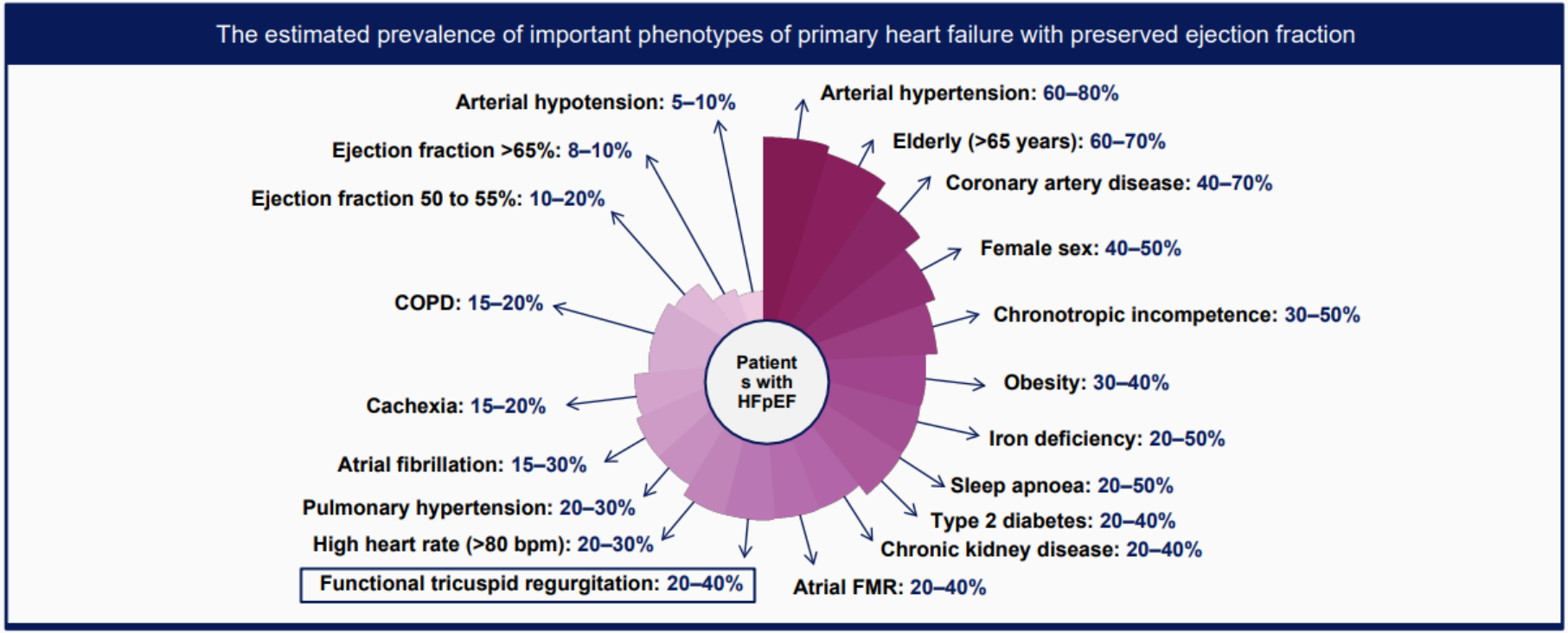

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