

The Systemic Right Ventricle: Risks and outcomes of congestive heart failure

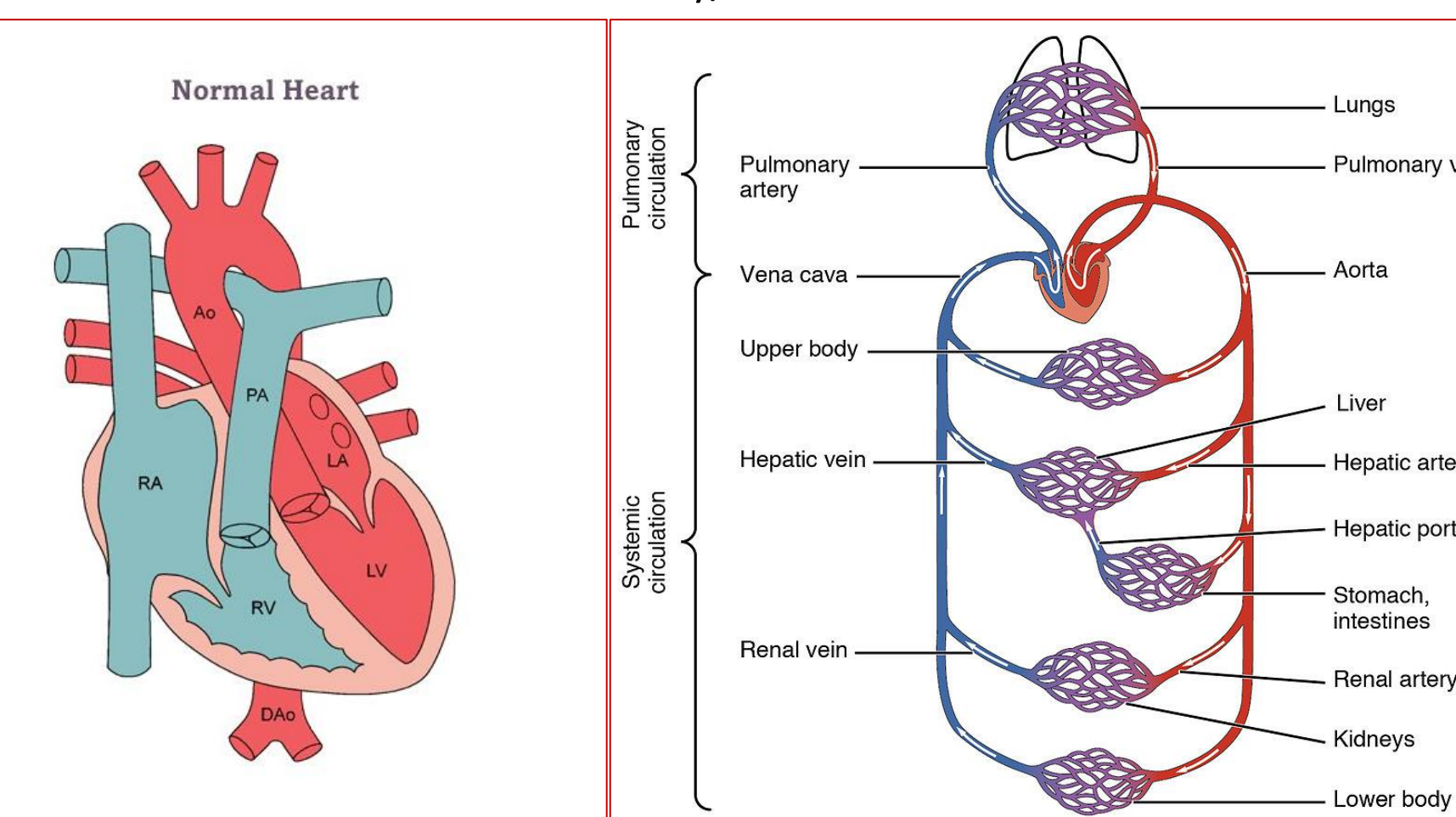
Michael Durr, Payam Dehghani, Jyotpal Singh, Muhammad Siddiqui

Background

The systemic right ventricle (SRV) is a distinct heart anatomy wherein the morphologic right ventricle supplies the systemic circulation, and the morphologic left ventricle supplies the pulmonic tract.

The two most common forms of SRV are complete transposition of the great arteries (TGA) with atrial switch operation, and congenitally corrected TGA (ccTGA).

Normal anatomy/circulation



Why is the SRV problematic?

Inappropriate right ventricle architecture and adaption, valvular anomalies, conduction defects, risks with surgical interventions.

The morphologic right ventricle function is a key determinant of clinical status and long-term outcomes. Systolic dysfunction leading to congestive heart failure (CHF) is expected.

Standard heart failures pharmacotherapies and implantable cardiac defibrillators have little to no desired effects even when systolic function is poor.

Objectives and Aims

Existing studies on SRV are small and significantly limited; this project is contributing to the largest SRV retrospective study to stratify patient risks and to inform the ventricular-clinical CHF relationship.

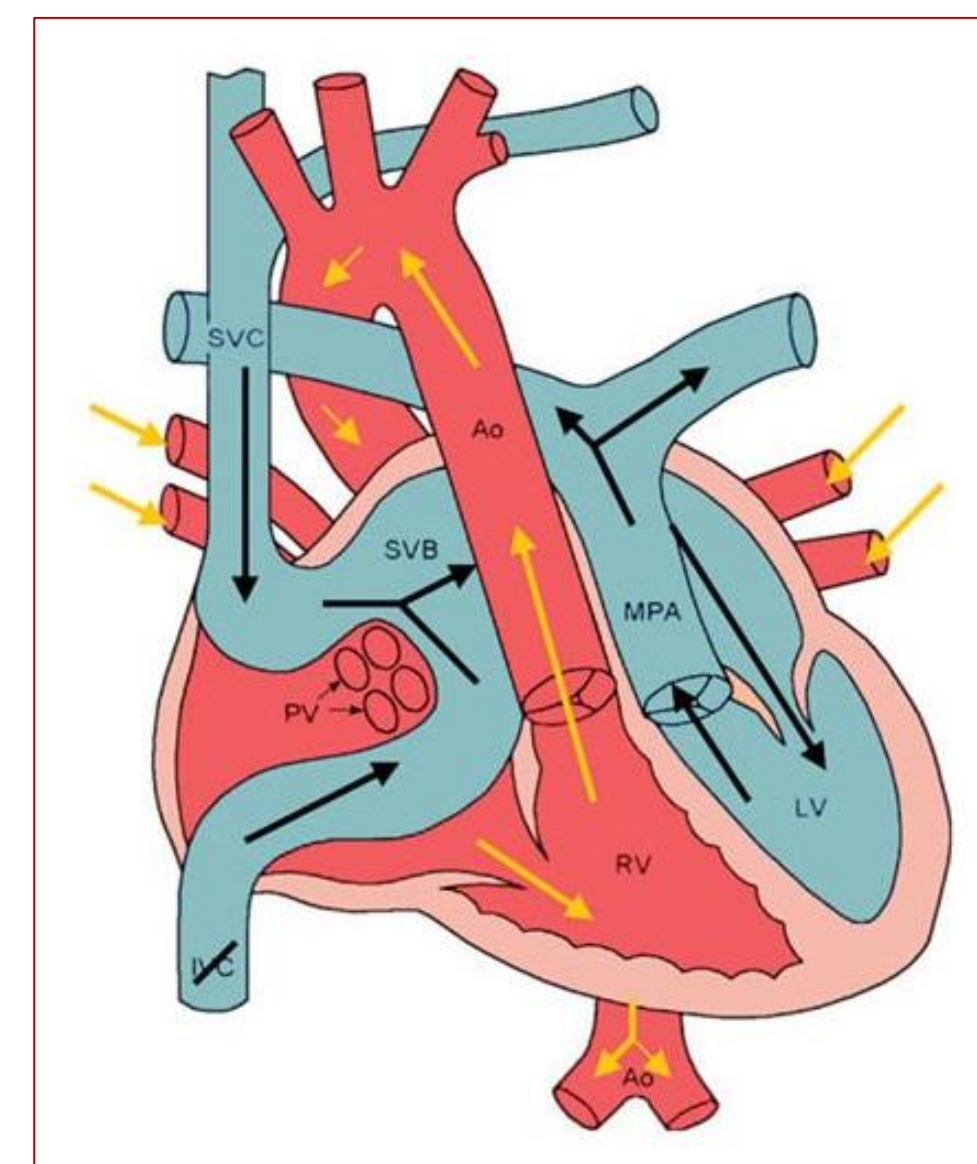
We aim to characterize magnitude of and risks for clinical heart failure: major adverse cardiac events, worsening CHF, success of transplant surgery.

Methods

Multicentre retrospective cohort study. Patients with SRV due to TGA with atrial switch or ccTGA with at least 1 year of follow-up; single ventricular anatomy patients excluded (e.g., double outlet right ventricle).

Saskatchewan data: 7 patients met inclusion criteria.

TGA with Atrial Switch (D-TGA)

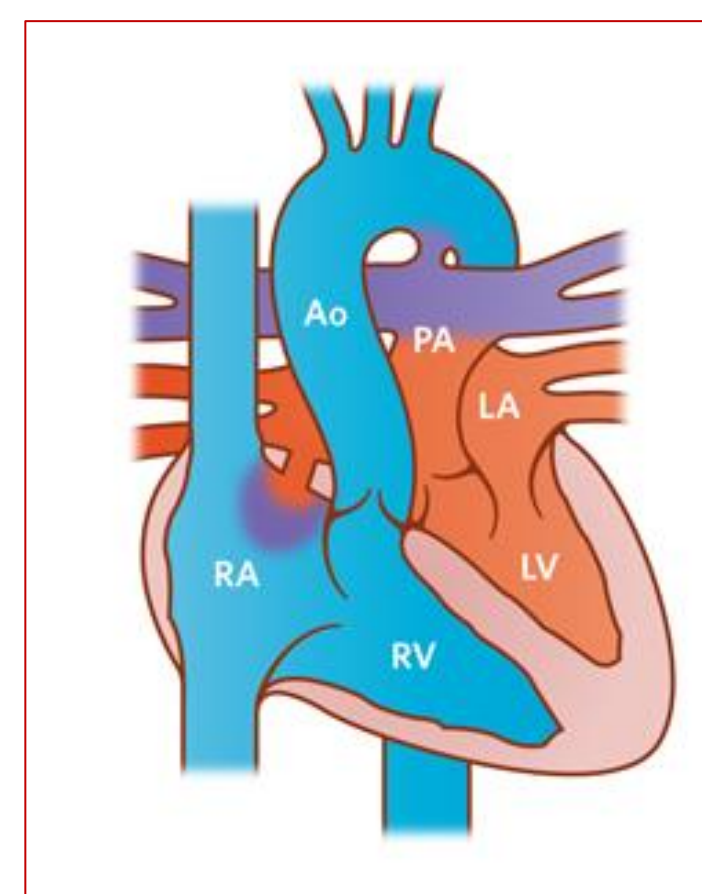


RA → RV → systemic; LA → LV → pulmonic

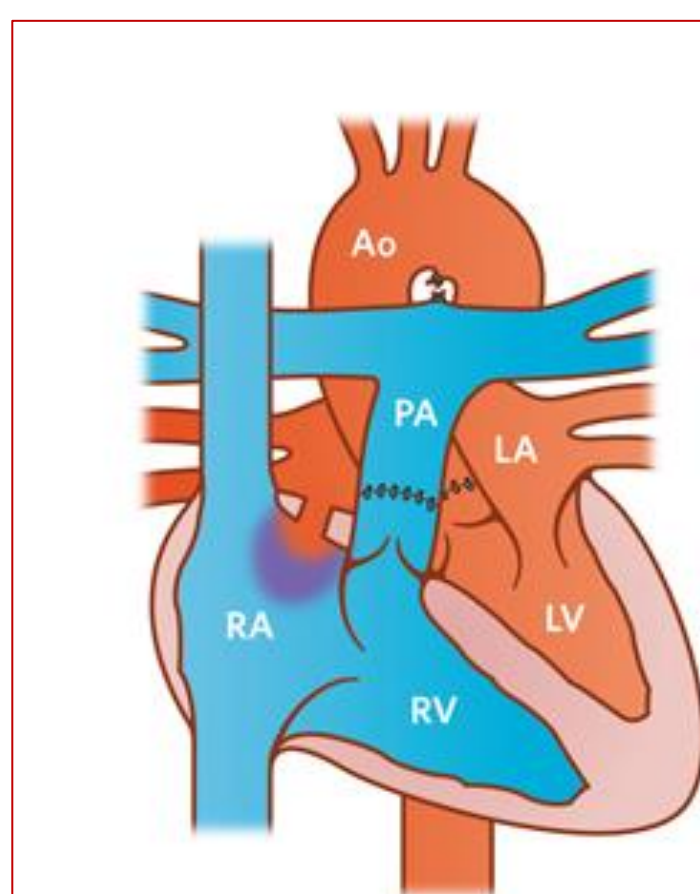
Atrioventricular concordance, ventriculoarterial discordance.

Early surgery needed. Atrial switch: systemic right ventricle preserved; atrial flow redirected via surgical baffle. Arterial switch: surgical switch of great arteries (no longer a SRV).

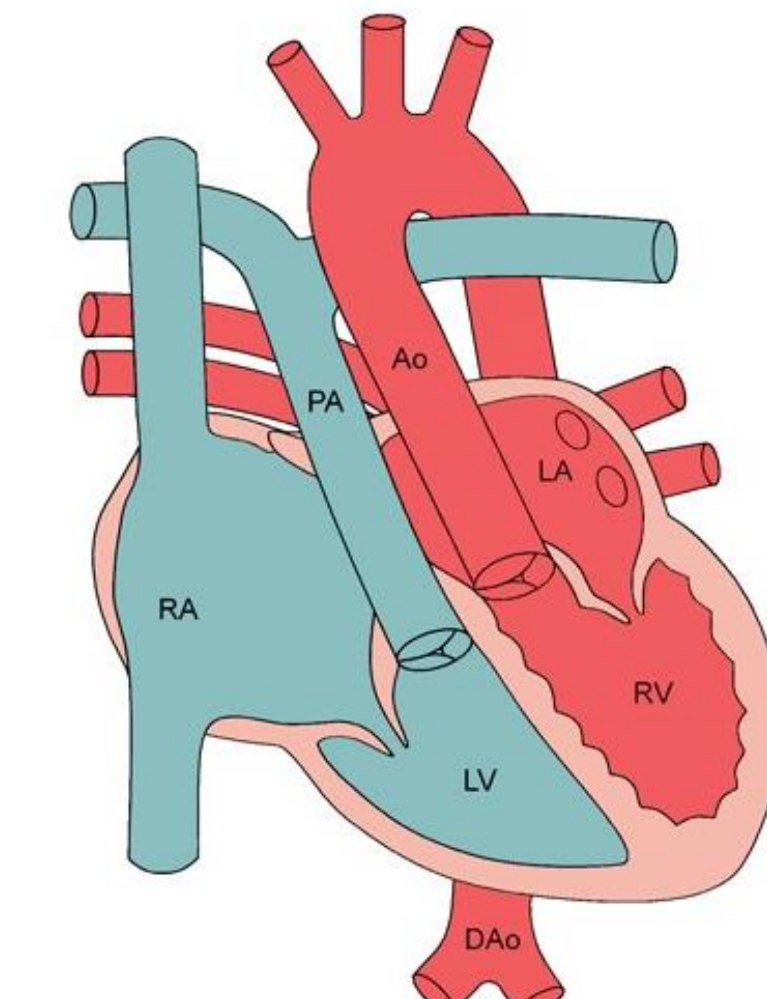
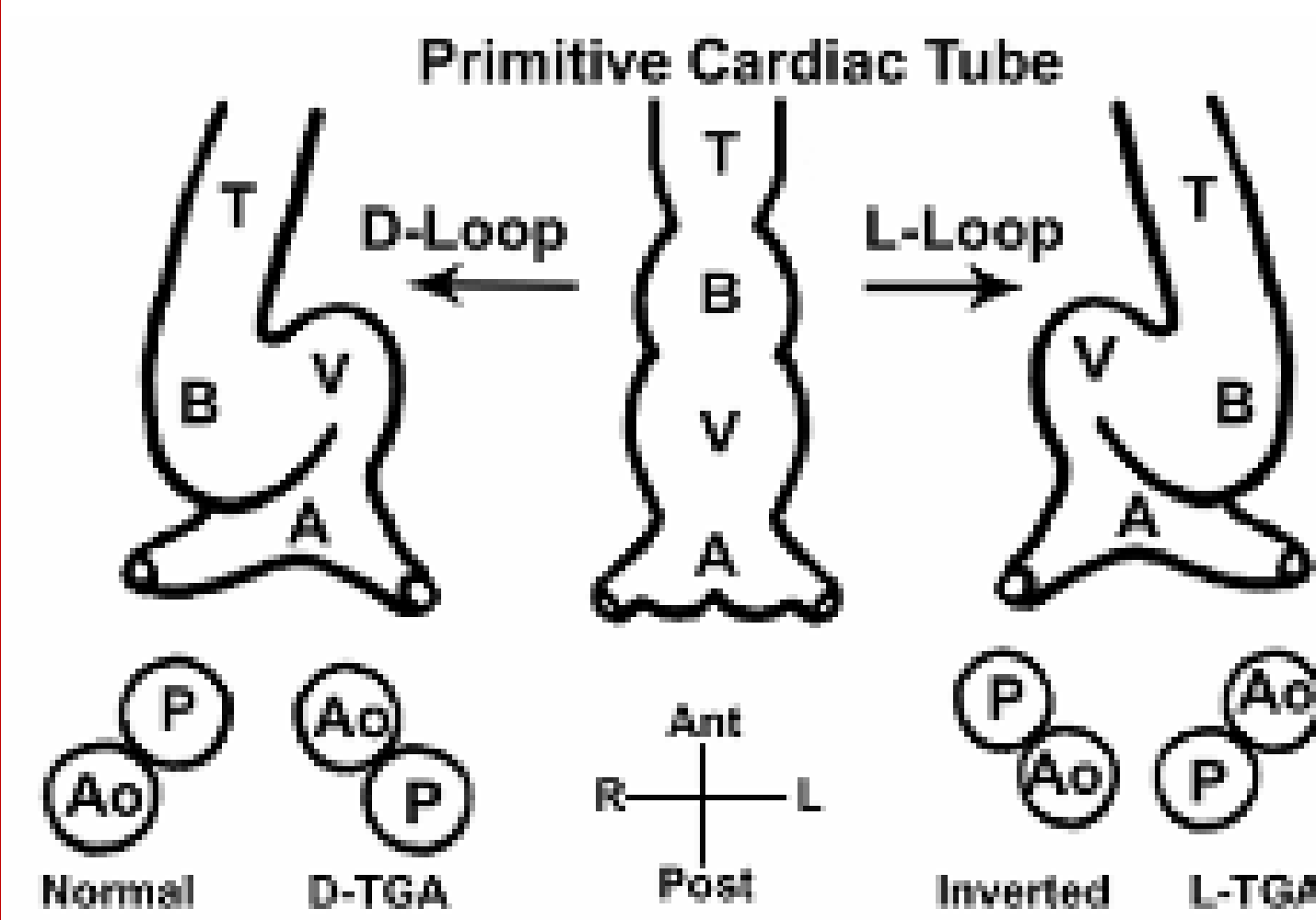
Pre-surgical Anatomy in TGA



TGA Anatomy - Arterial Switch



Congenitally Corrected TGA (L-TGA)

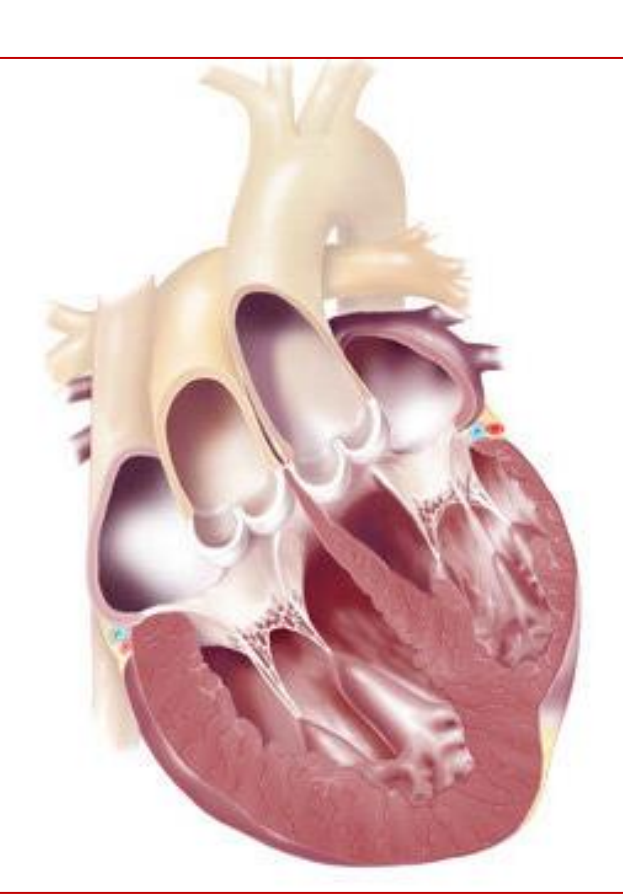


RA → LV → pulmonic; LA → RV → systemic

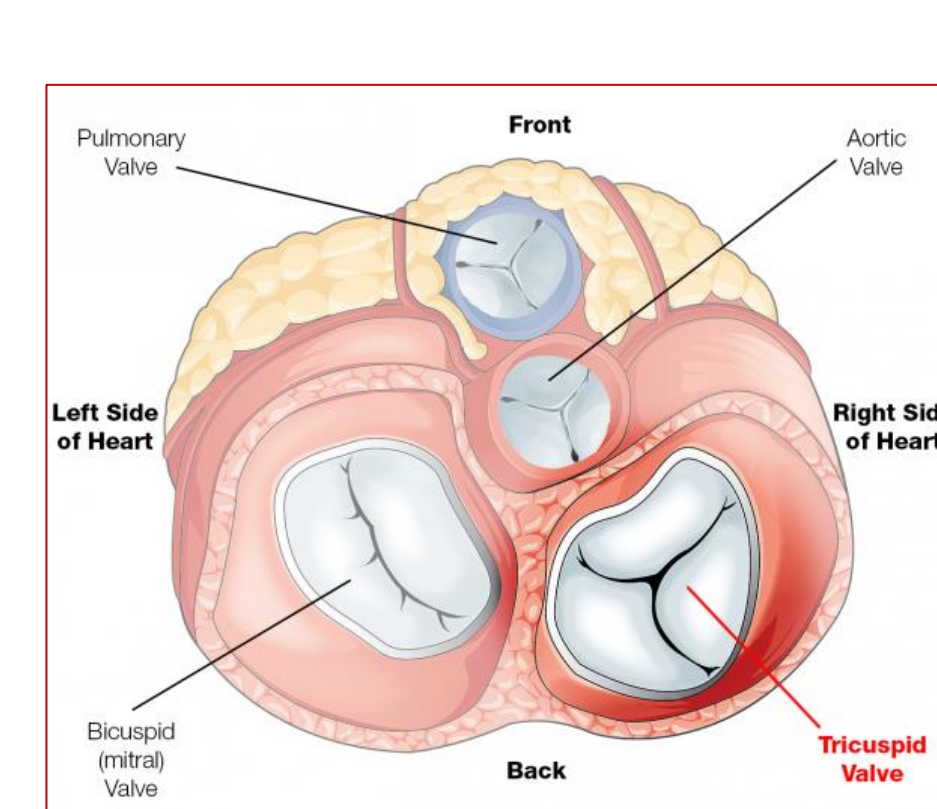
Atrioventricular discordance, ventriculoarterial discordance. *The morphologic right ventricle is to the left of the morphologic left ventricle*

Intrinsic Ebstein's anomaly causes systemic atrioventricular valve regurgitation. Higher life expectancy than TGA with atrial switch

ccTGA Heart Anatomy

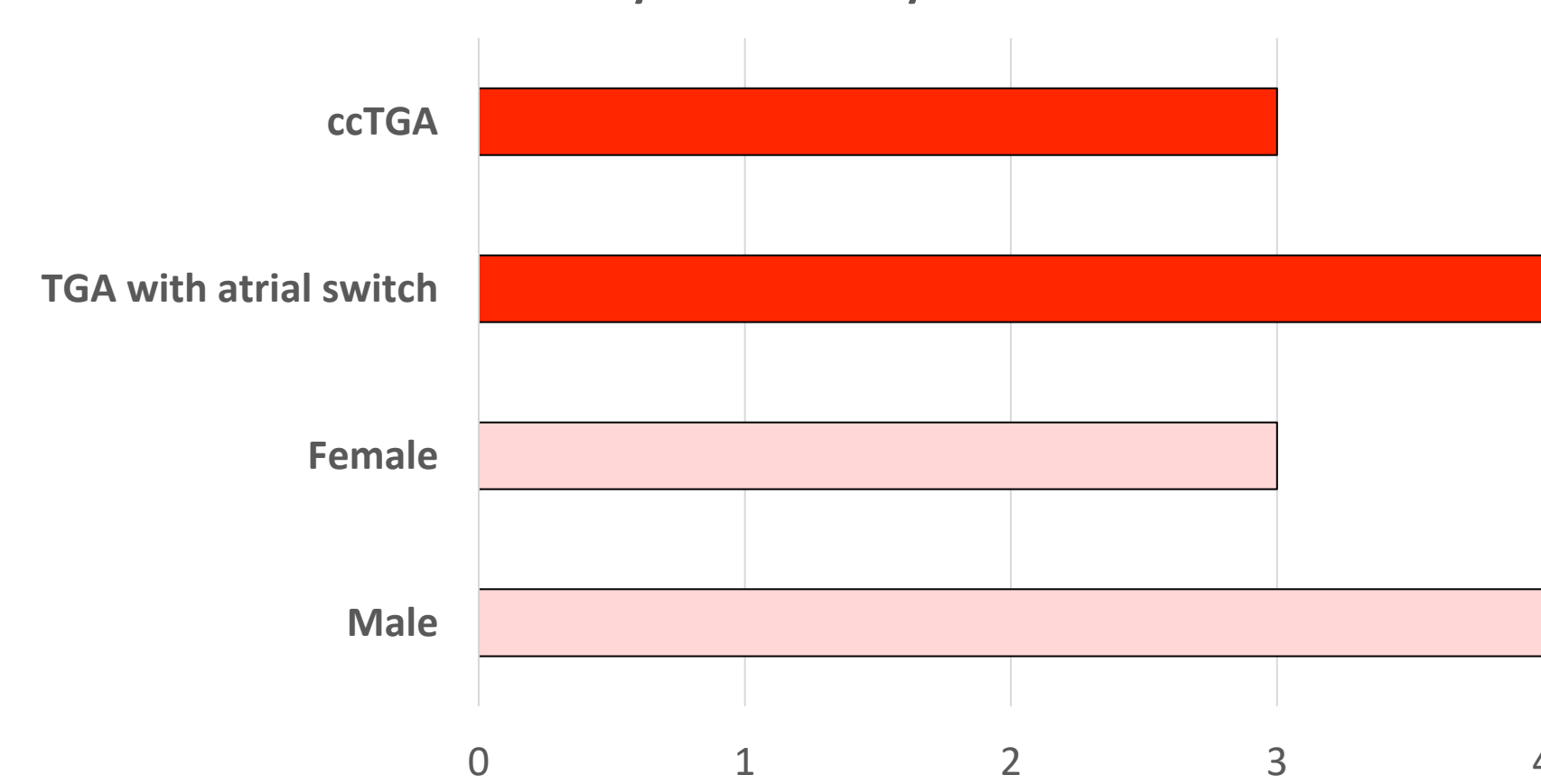


Normal Valve Anatomy

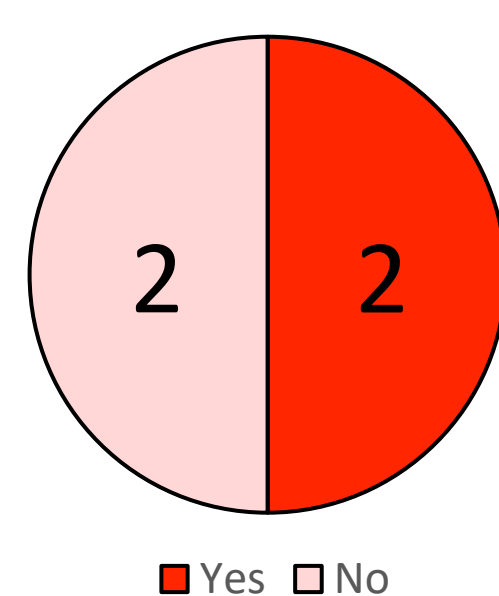


Results – Saskatchewan Systemic Right Ventricle Patients

Cardiac Anatomy and Sex of Systemic RV Patients



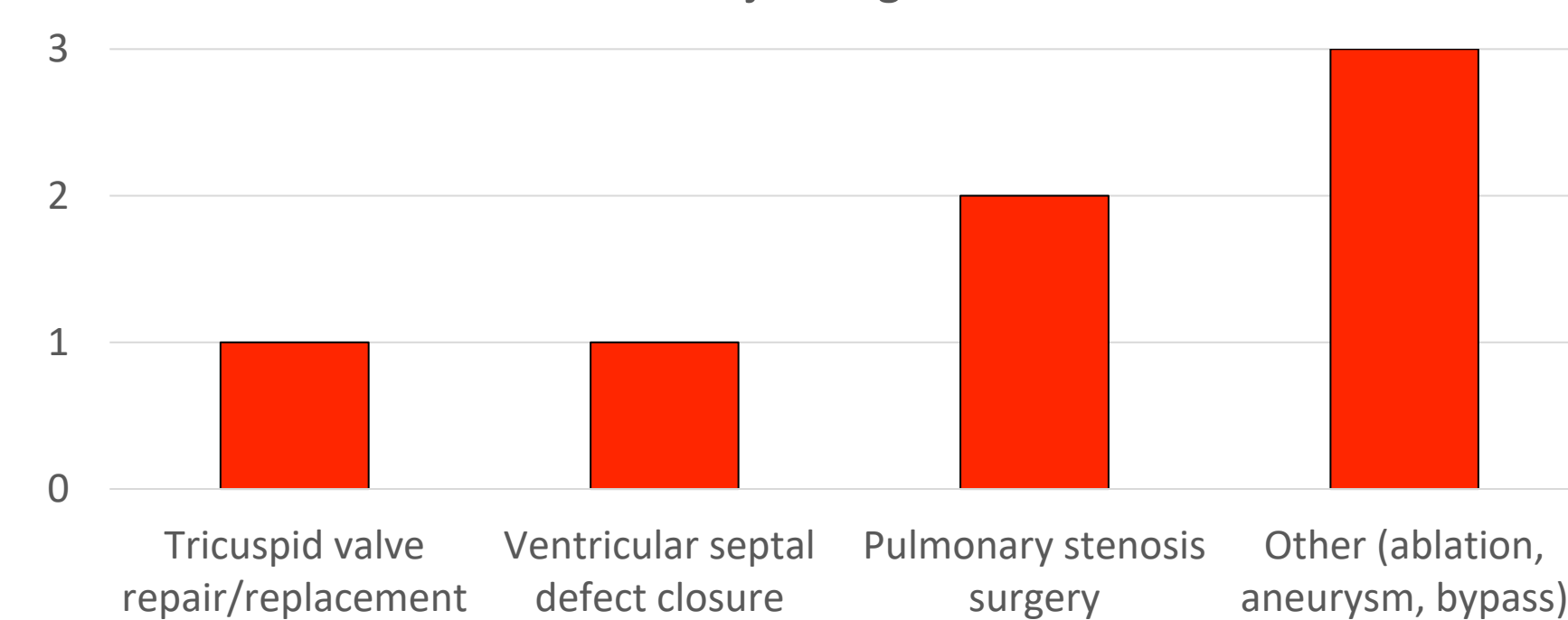
TGA with Atrial Switch Patients Requiring Baffle Intervention After Initial Surgery



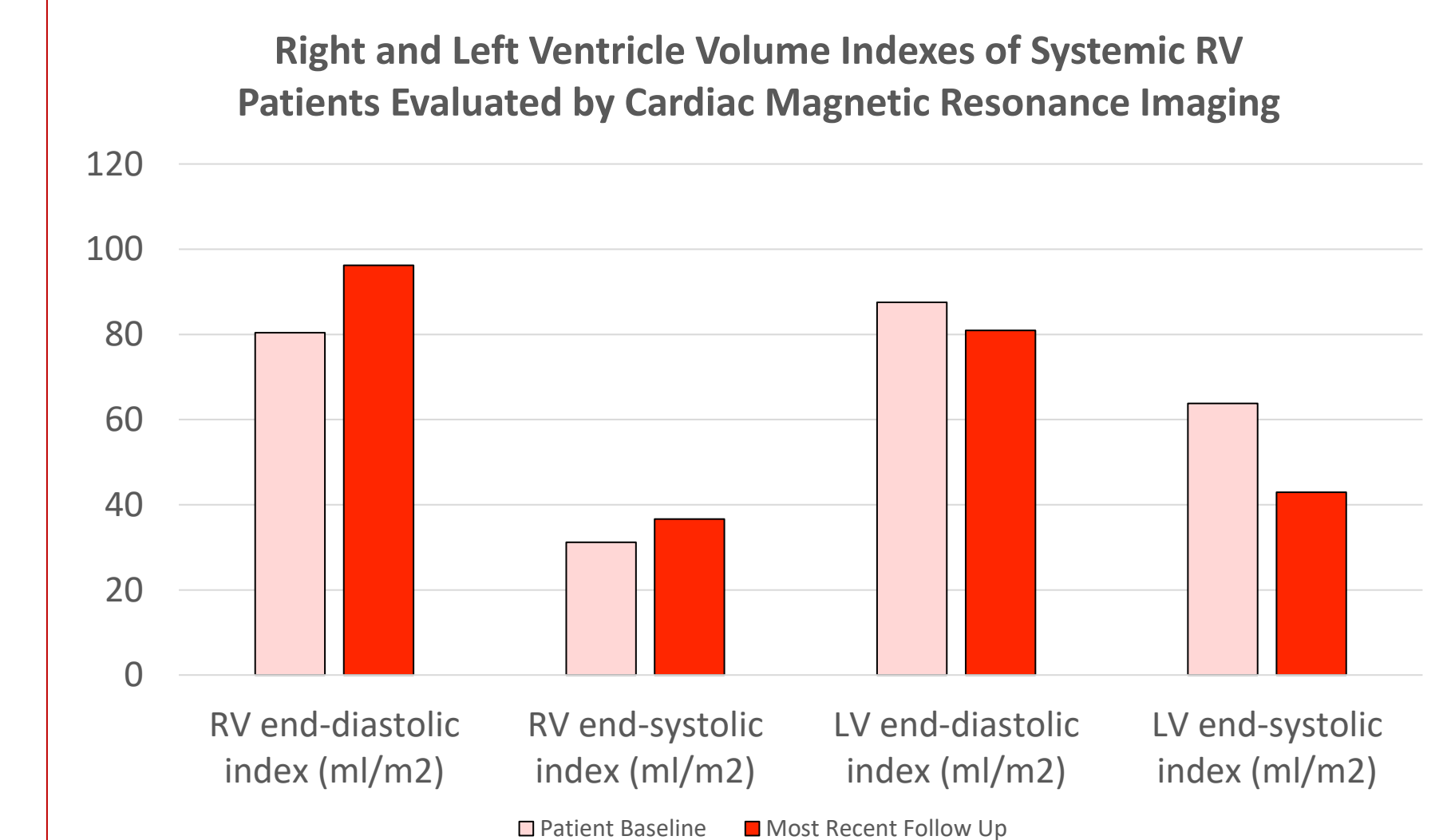
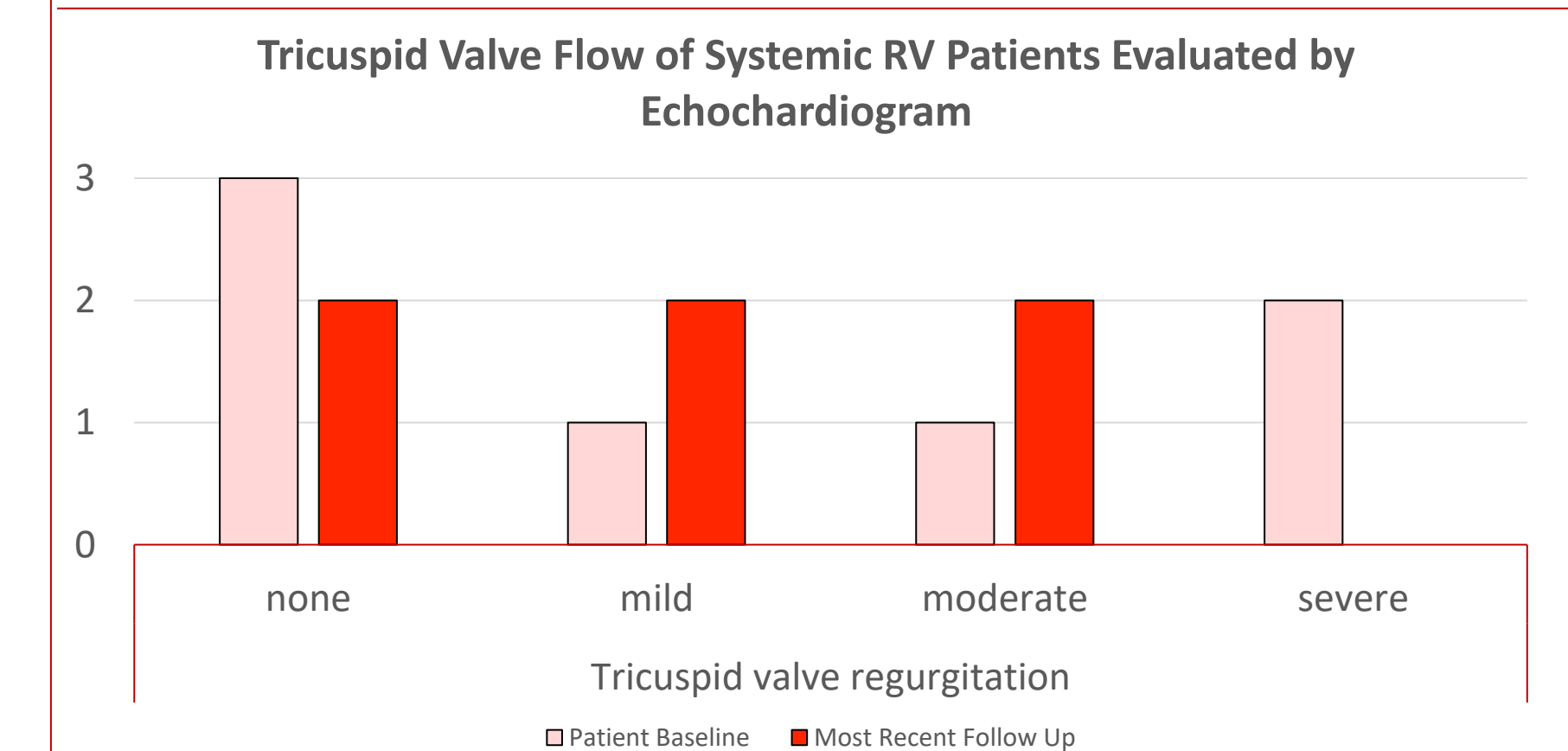
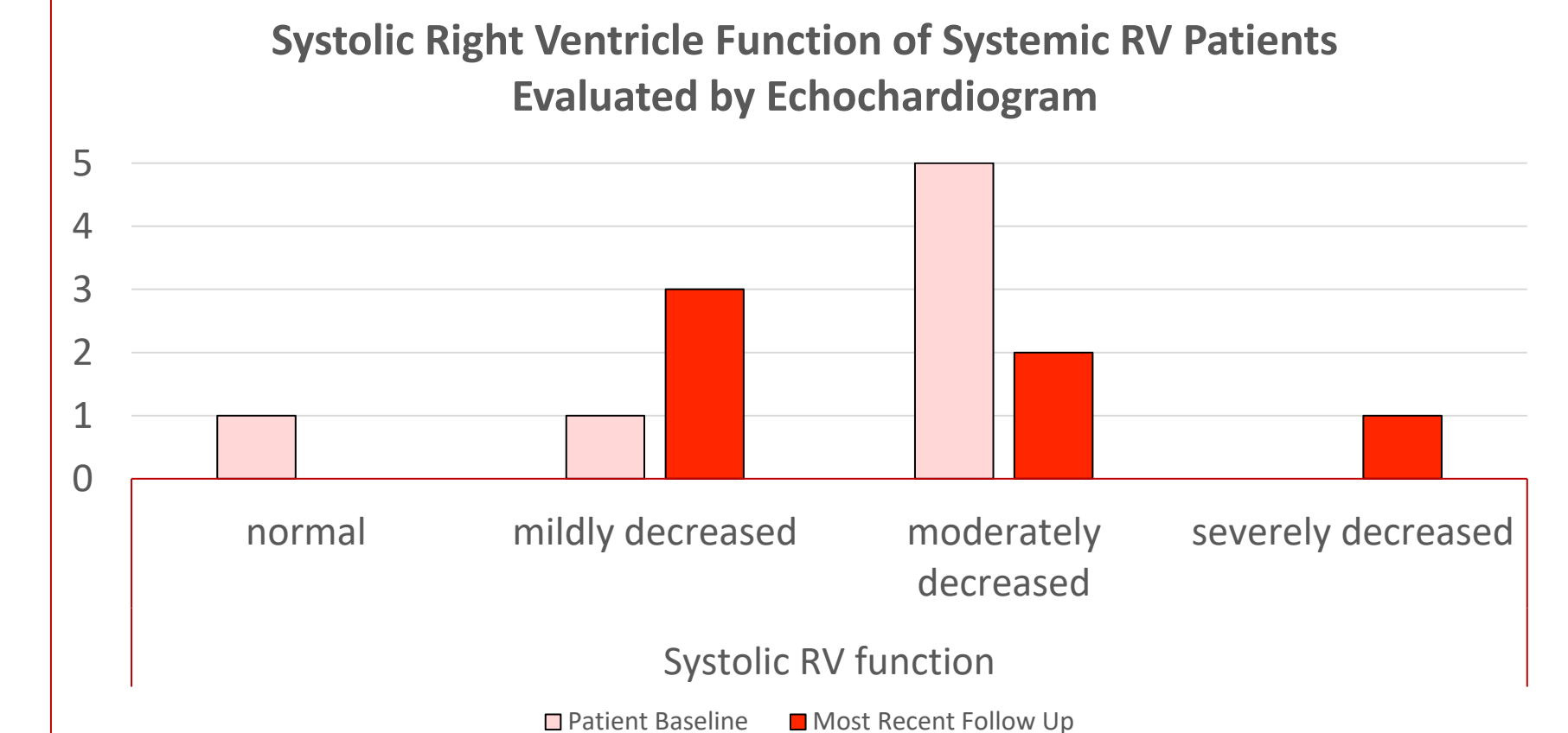
Comorbidities and Prescriptions of Systemic RV Patients at Baseline and Most Recent Follow Up

	Baseline visit		Most recent follow up	
	Yes	No	Yes	No
Diabetes	0	7	3	4
HTN needing Rx	1	6	5	2
Betablocker Rx	1	7	5	2
ACE/ARB Rx	2	5	5	2
Loop diuretic Rx	0	7	2	5
Spirolactone Rx	0	7	3	4
Antiplatelet Rx	1	6	1	6
Anticoagulant Rx	0	7	1	6
Death	-	-	0	7

Incidence of Major Surgeries Performed



Results – SRV Imaging



Conclusions and Future of SRV

Multicentre study from American Association of Respiratory Care and the American Heart Association.

Currently, 1850 patients added to the database. Data on demographics, heart failure history, arrhythmia history, exercise performance, investigations, imaging, outcomes.

- Multivariate analysis will be based on significant univariate predictors.
- As there are likely differences in D-TGA and L-TGA and these associations, we will also perform univariate analysis for D-TGA and L-TGA groups separately.
- Time varying analysis will be used to account for expected differences between baseline visit and time of other testing such as CPEX or CMR.