



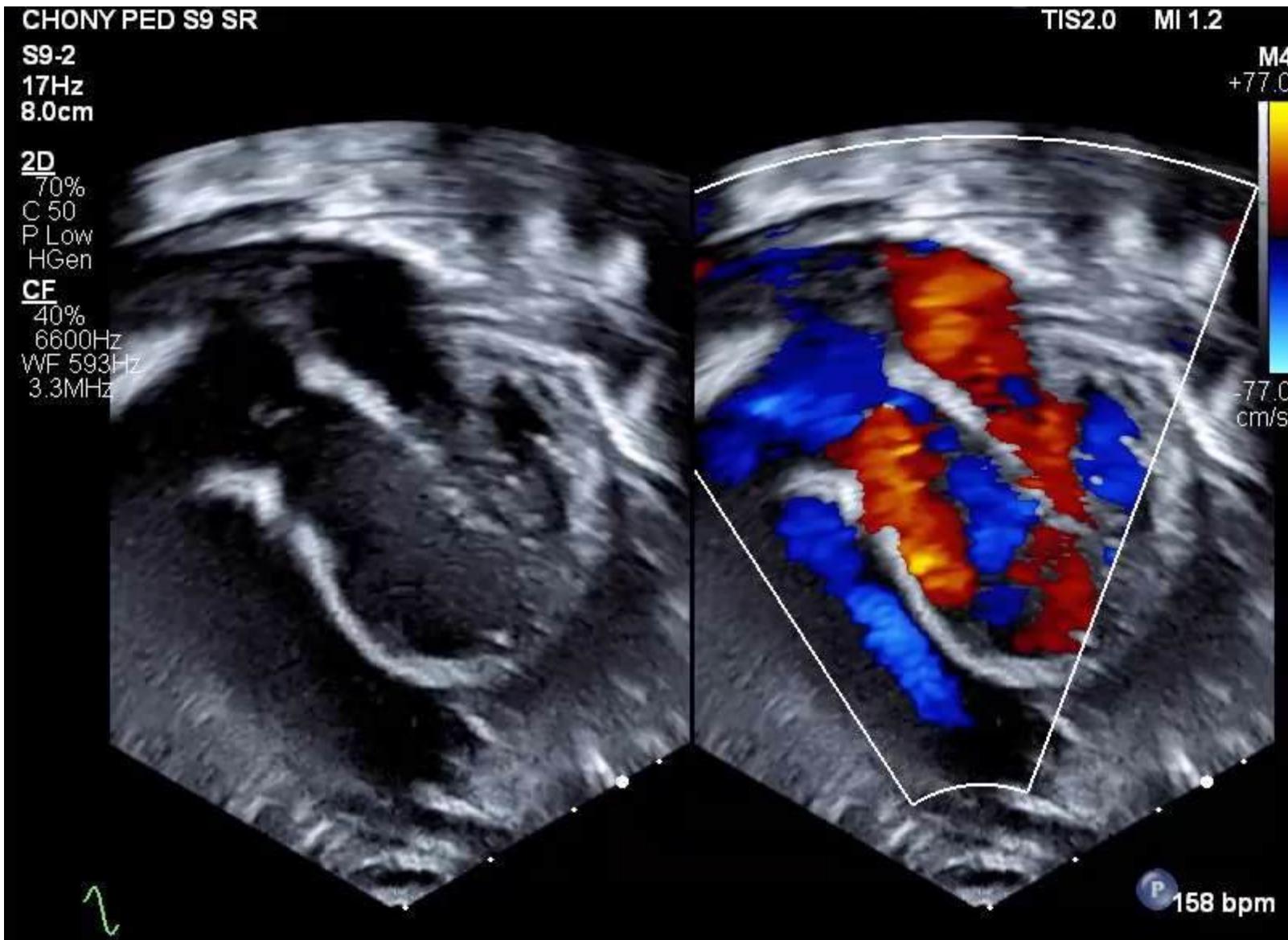
(DOMINO) VALVE TRANSPLANT

Congenital Cardiac Surgery 2025 Update

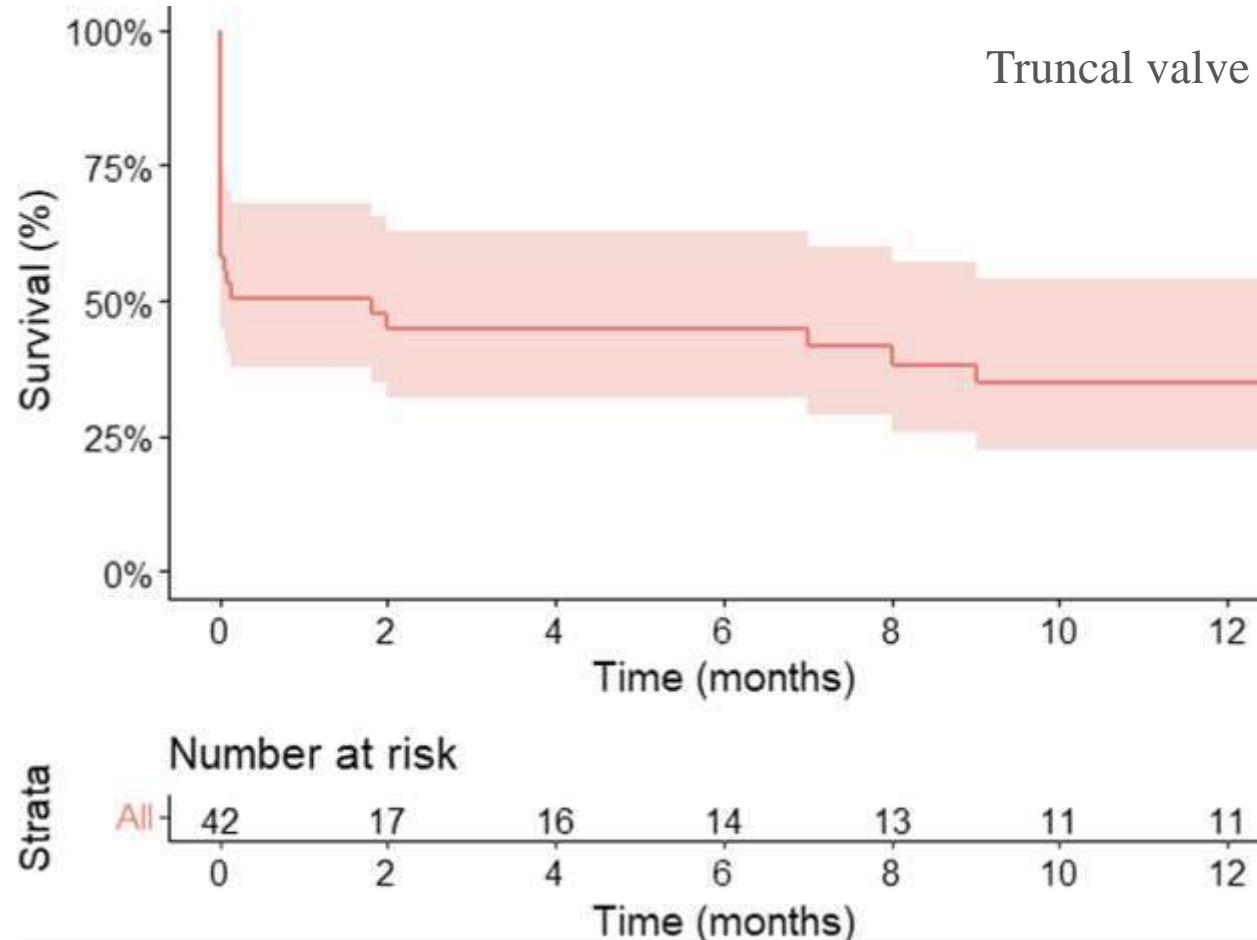
Andrew B. Goldstone, MD, PhD
Columbia University Vagelos College of Physicians and Surgeons

Disclosures

None



Truncal Valve Replacement



Options for Valve Replacement



TISSUE VALVES:
Sizes available: 19mm-29mm



HOMOGRAFTS:
Sizes available: 7mm-32mm



OZAKI:
Sizes available: no limits



MECHANICAL VALVES:
Sizes available: 15mm-27mm



ROSS PROCEDURE:
Sizes available: no limits

Homograft AVR in Neonates/Infants

Outcome	Overall (n = 160)	Ross-Konno (n = 101)	Ross (n = 44)	Homograft (n = 15)
In-hospital mortality, n (%)				
Overall	29 (18)	19 (19)	4 (9)	6 (40)
Neonates	12 (28)	10 (29)	2 (29)	0 (0)
Infants	17 (14)	9 (14)	2 (5)	6 (43)
Cardiac arrest, n (%)				
Overall	13 (8)	9 (9)	2 (5)	2 (13)
Neonates	4 (9)	2 (6)	1 (14)	1 (100)
Infants	9 (8)	7 (11)	1 (3)	1 (7)
Mechanical circulatory support, n (%)				
Overall	17 (11)	12 (12)	3 (7)	2 (13)
Neonates	8 (19)	6 (17)	2 (29)	0 (0)
Infants	9 (8)	6 (9)	1 (3)	2 (14)
Length of stay, d, median (IR)				
All ages	12 (6-26)	15 (8-28)	8 (5-14)	10 (5-28)
Neonates	20 (14-39)	20 (15-39)	17 (9-72)	75 (75-75)
Infants	10 (6-19)	11 (7-25)	7 (5-13)	10 (5-23)

Data are presented as median and interquartile range for continuous variables, and number and percent for dichotomous variables. *IR*, Interquartile range.

Woods et al. JTCVS 2012

Historical Data (no immunosuppression)

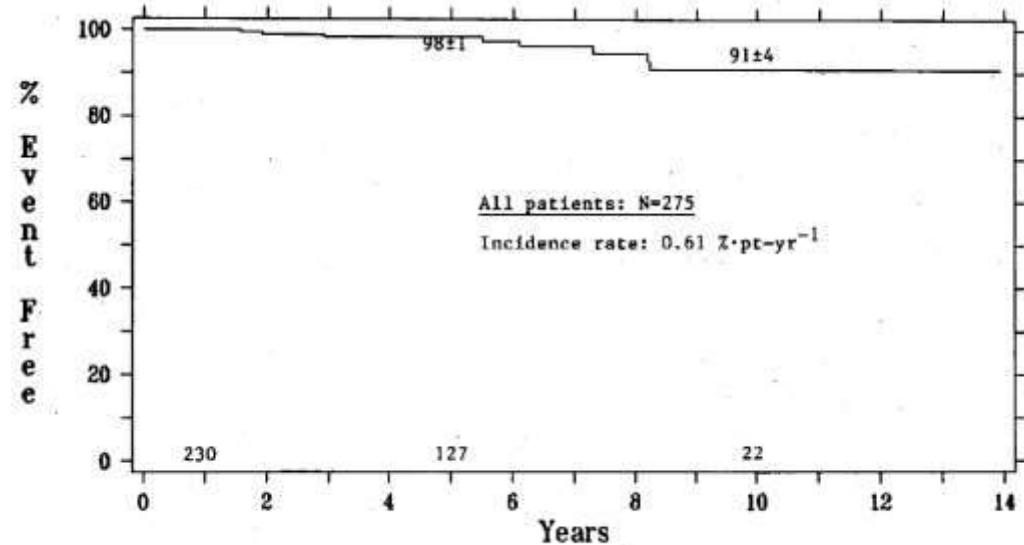


Fig. 4. Cumulative rates for freedom from reoperation in all patients. Risk values presented as in Fig. 2.

N=275

Miller DC. J Card Surg. 1987

Yacoub M. JTCVS. 1995

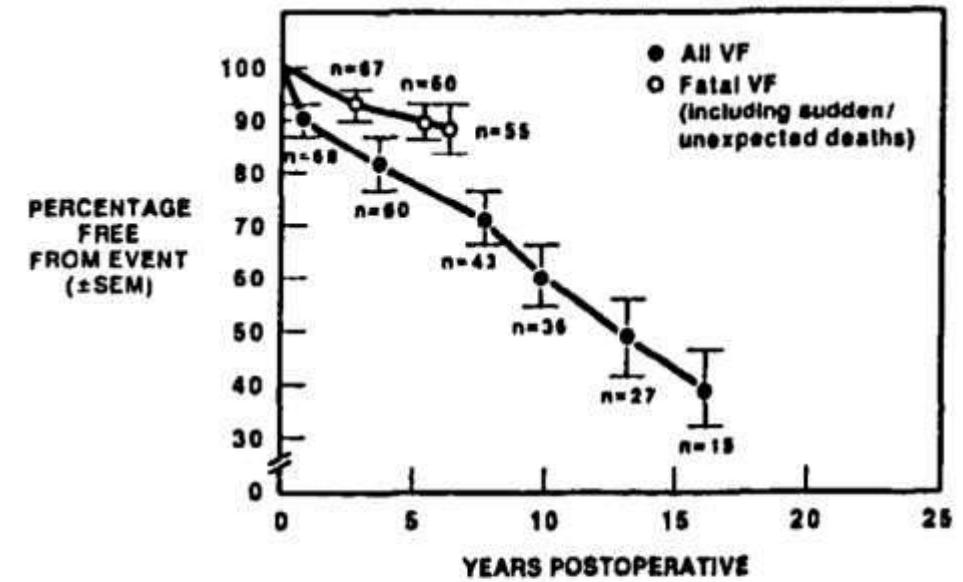
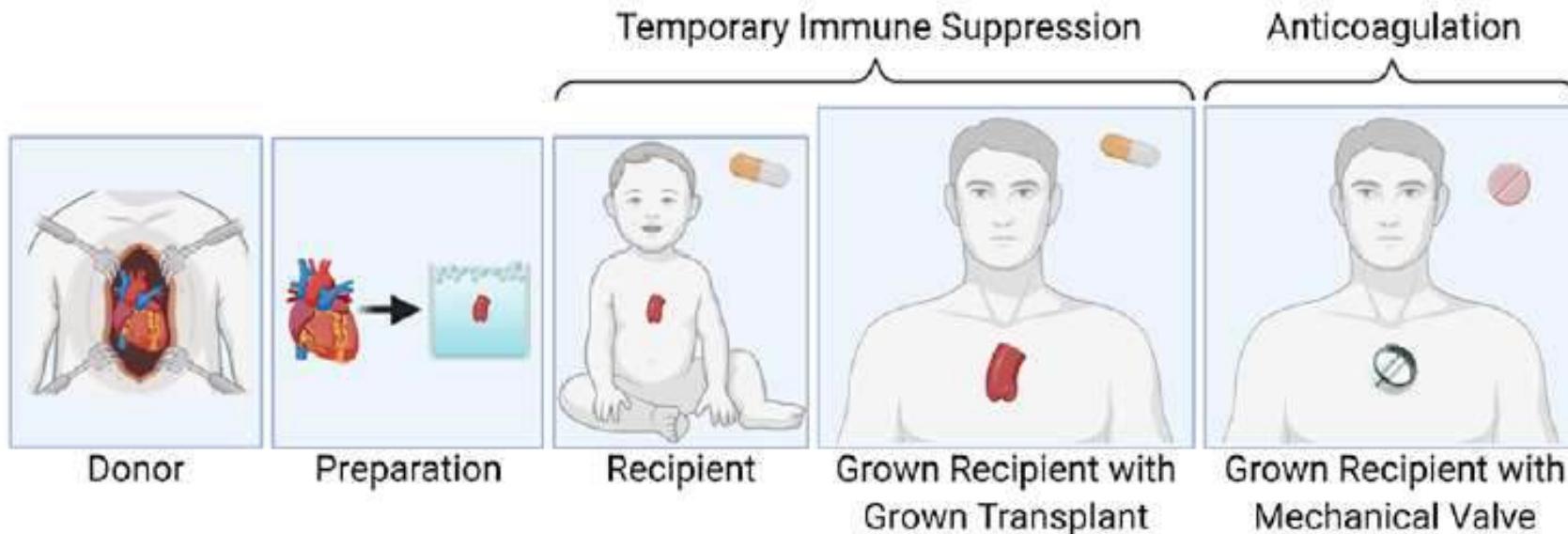


Figure 3. Actuarial incidence of all modes of valve failure (closed circles) and fatal valve failure (open circles); the latter includes all sudden, unexplained deaths in an effort to be conservative and comprehensive.

N=83

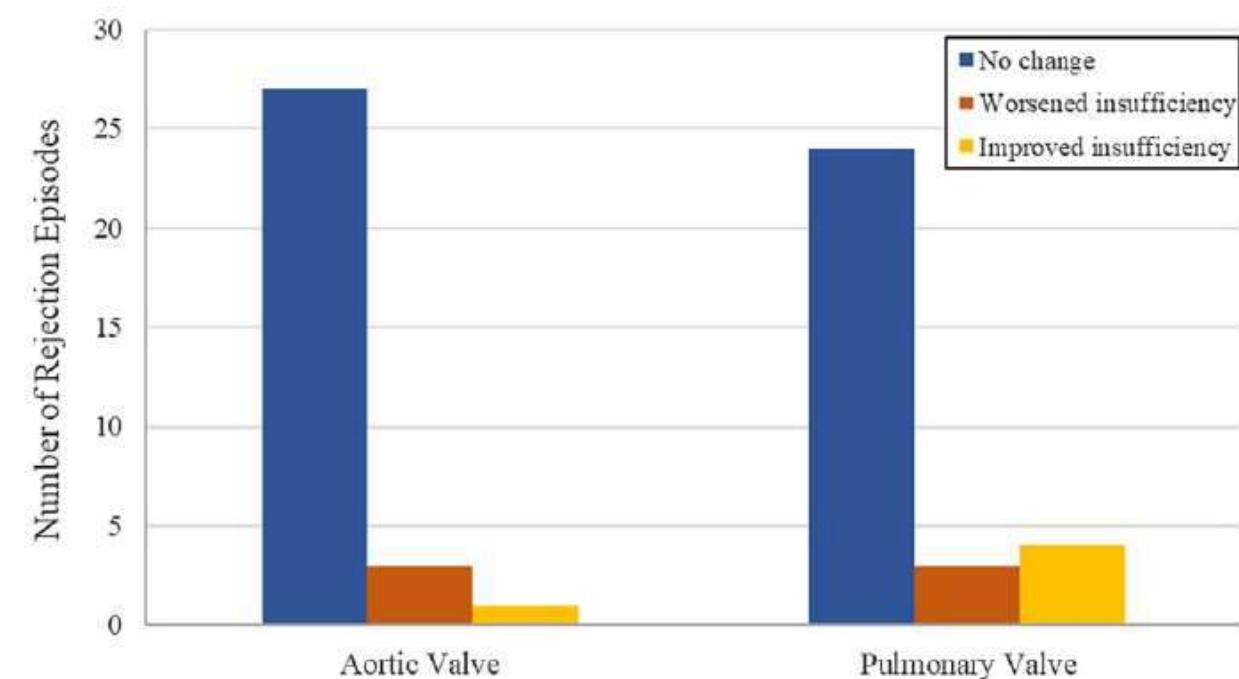
Partial Heart Transplant



- Valve(s) procured from unused heart as homograft
- Living homograft is prepared and implanted
- Recipient receives temporary immunosuppression

McVadon et al. Cardiol Young 2022.

Semilunar Valves Rarely Become Dysfunctional with Rejection



McVadon et al. Cardiol Young 2022

Partial Heart Transplant

Advantages

Living valve

Growth potential

Repair potential

No anticoagulation

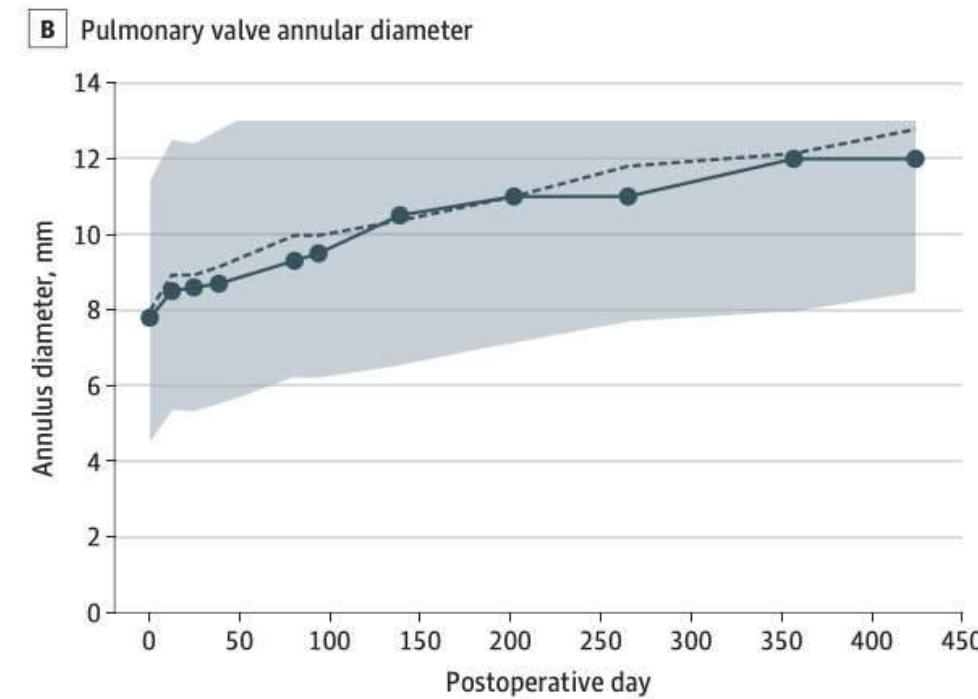
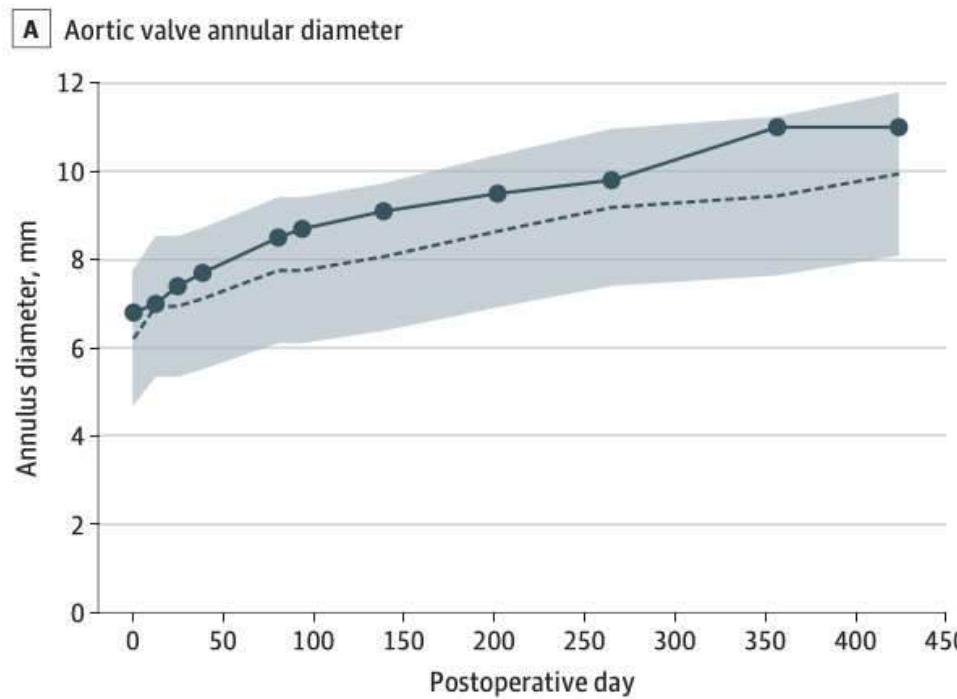
Disadvantages

Immunosuppression

Availability

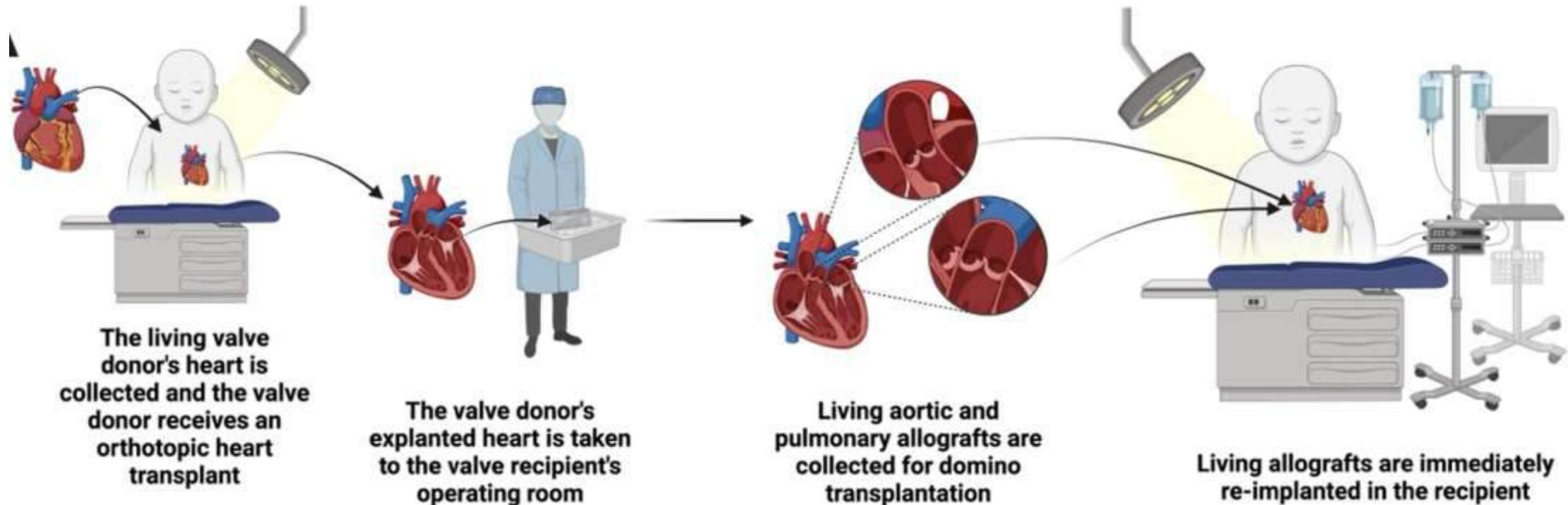
Partial Heart Transplant in a Neonate With Irreparable Truncal Valve Dysfunction

Joseph W. Turek, MD, PhD, MBA; Lillian Kang, MD; Douglas M. Overbey, MD; Michael P. Carboni, MD; Taufiek K. Rajab, MD, DrMed



Turek et al. JAMA 2024

Domino Heart Valve Transplant



- Minimizes cold ischemic time
- Known donor facilitates immunologic surveillance

Kalfa et al. JACC. In press.

Initial Potential Candidates

Age <8 years

Truncus arteriosus with truncal valve disease

Aortic valve disease with Ross contraindication or poor durability expected

Need for RV-PA conduit

No contraindication to immunosuppression

Mitral and tricuspid valve also possible, though less is known

Our Experience

8 Patients

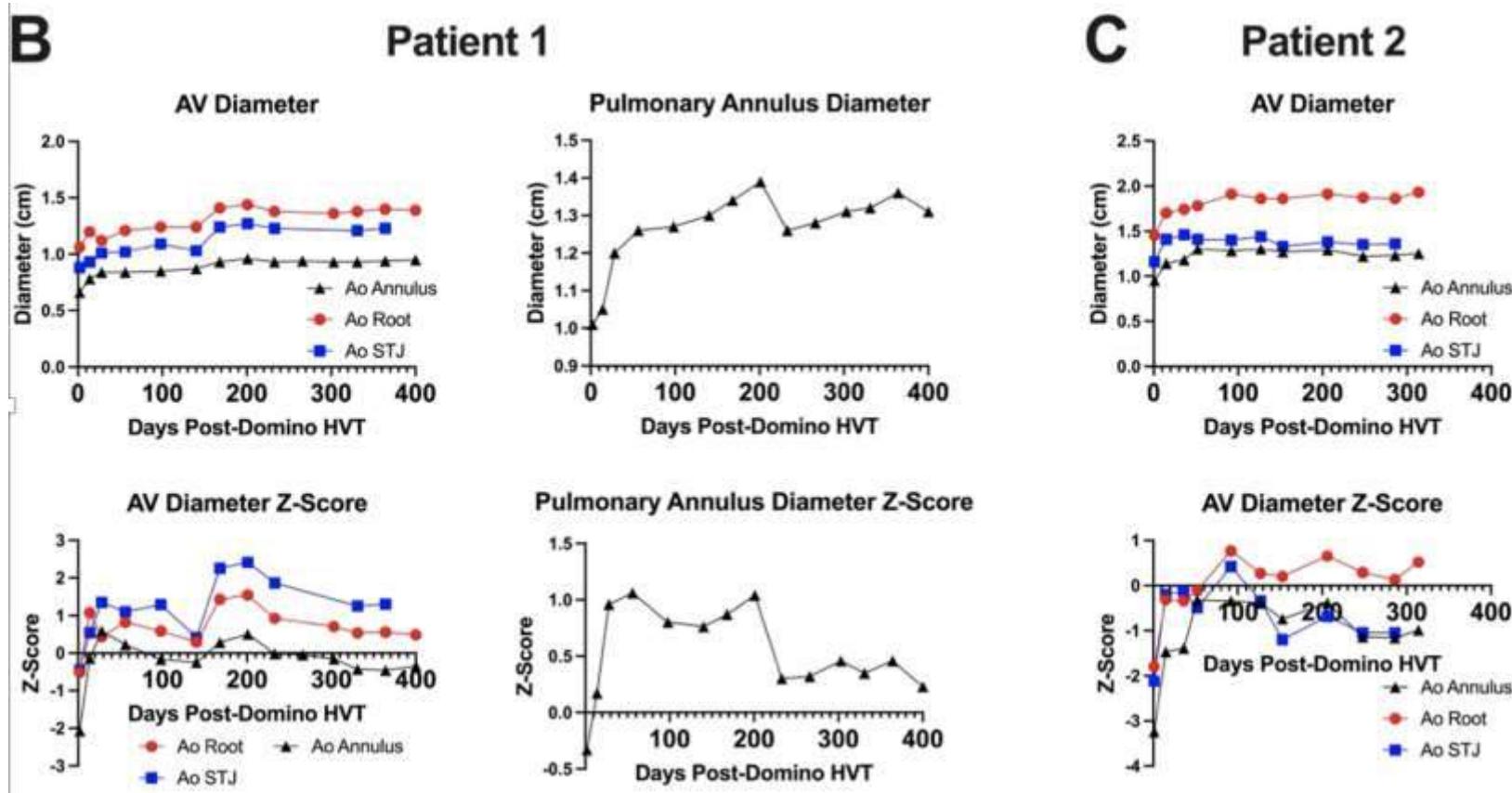
12 Valves

- 4 double valve
- 3 isolated aortic
- 1 isolated pulmonary

Majority performed as domino (75%)



Valve Growth



Kalfa et al. JACC. In press.

Valve Performance

Patient	Valves Received	Type	Last Follow-Up	AV Regurg	AV Gradient	PV Regurg	PV Gradient
1	A/P	Domino	20 mo	mild	35/18	mild	22/12
2	A	Domino	12 mo	mod	52/24		
3	A/P	Domino	6 mo	trivial	4/2	mod	52/29
4	A	Domino	6 mo	none	12/4		
5	P	Domino	6 mo			trivial	42/28
6	A/P	DCD	6 mo	trivial	47/24	trivial	44/24
7	A/P	Domino	3 mo	none	6/2	trivial	8/3
8	A	DCD	2 mo	trivial	5/2		

Kalfa et al. JACC. In press.

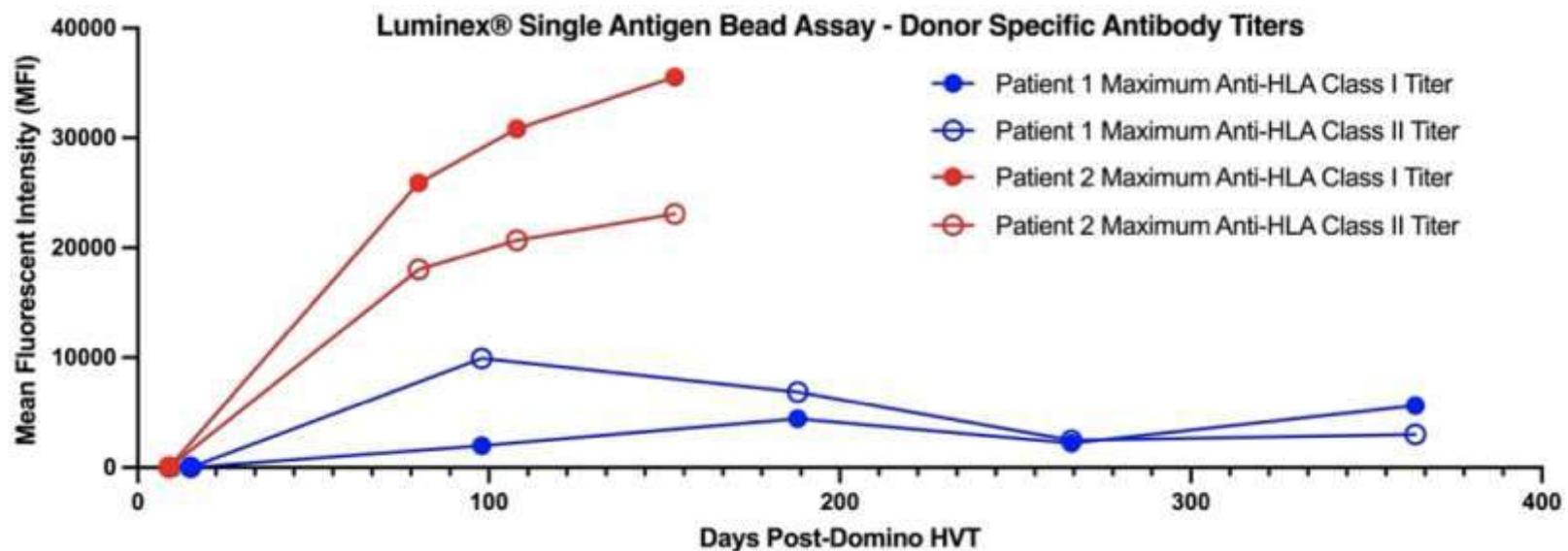
Immunosuppression & Immunogenicity

Tacrolimus, MMF, and

Prednisone

Steroids weaned first over 3
to 6 months

Monotherapy (tacrolimus)
by one year



Kalfa et al. JACC. In press.

Many Unanswered Questions

Growth potential and durability over the long term

How much immunosuppression is necessary?

Risk for endocarditis and postop infection?

How to surveil for and detect rejection?

How to allocate valves and best approach to oversight?

