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Schmidt, PhD, DMSc

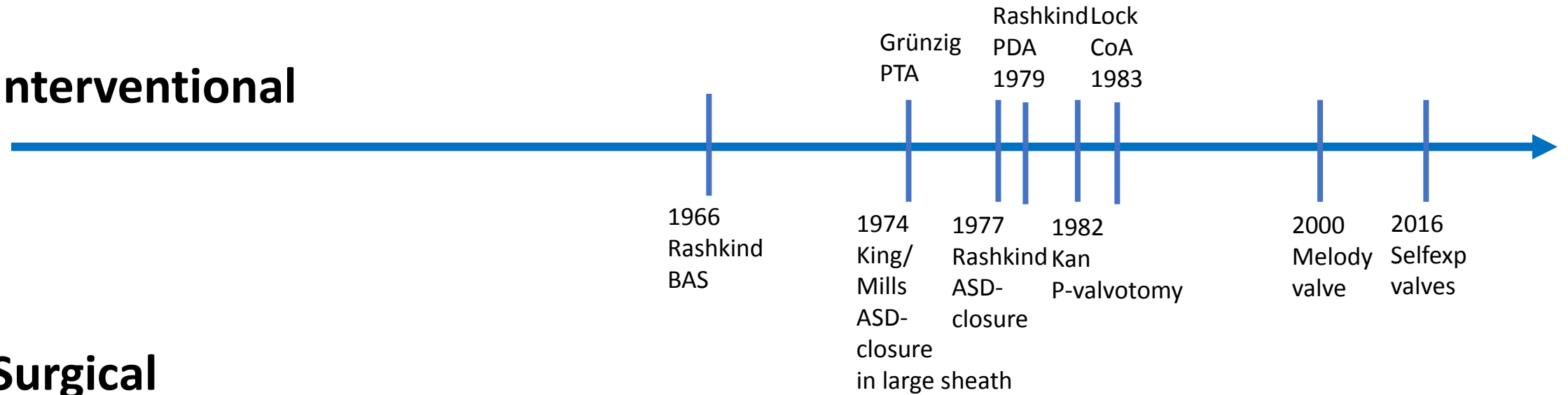
Rigshospitalet,
Copenhagen

Denmark

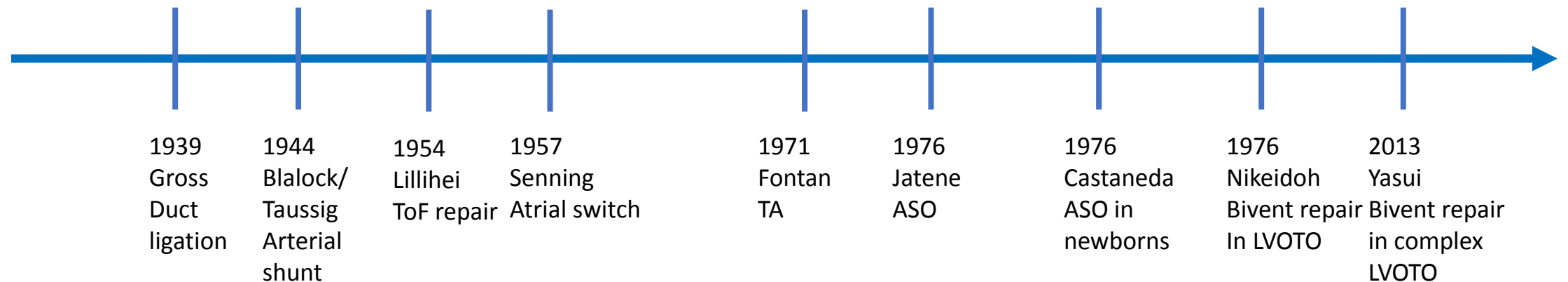
Interventions in congenital heart disease

Milestones in congenital heart disease

Interventional

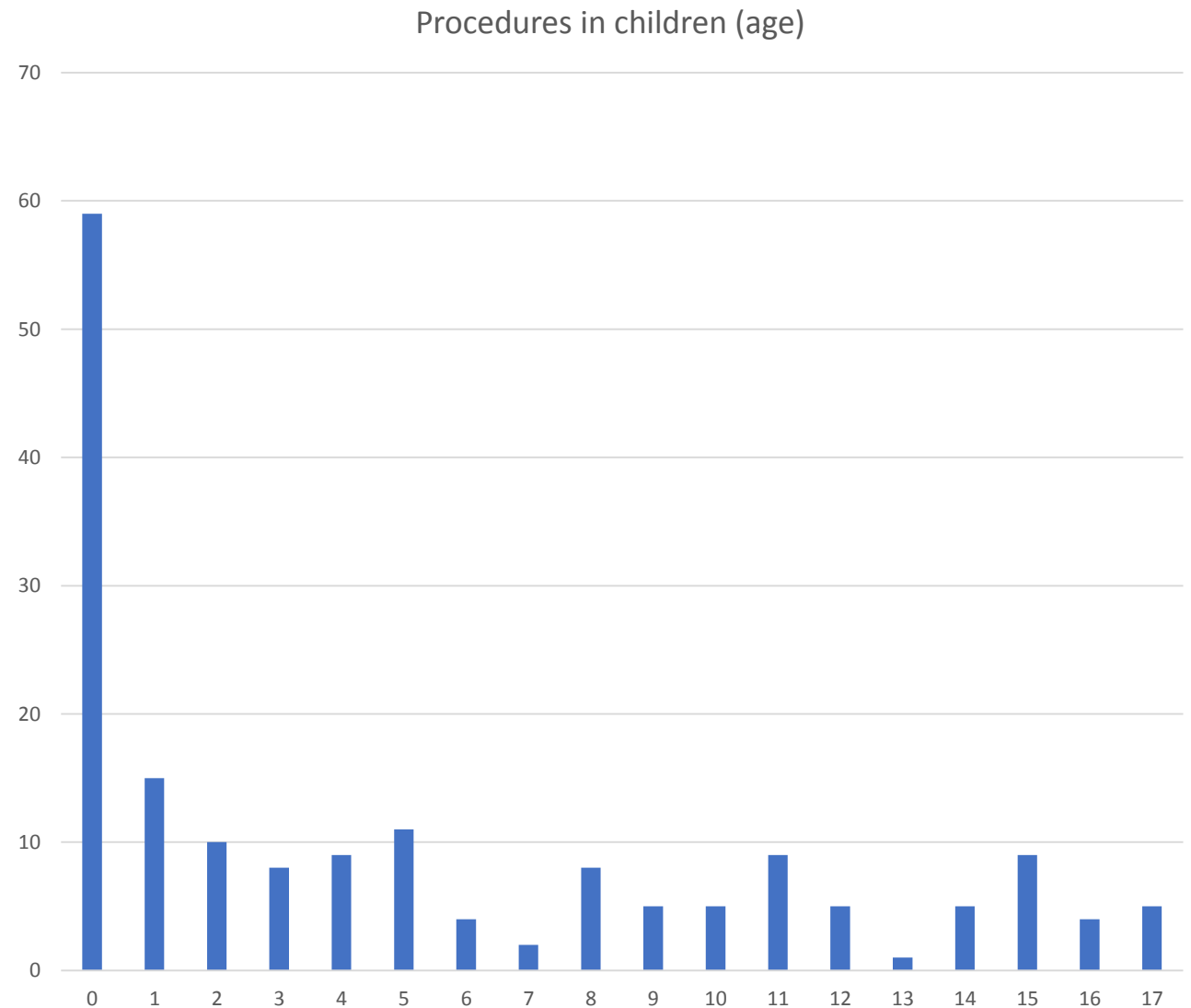


Surgical



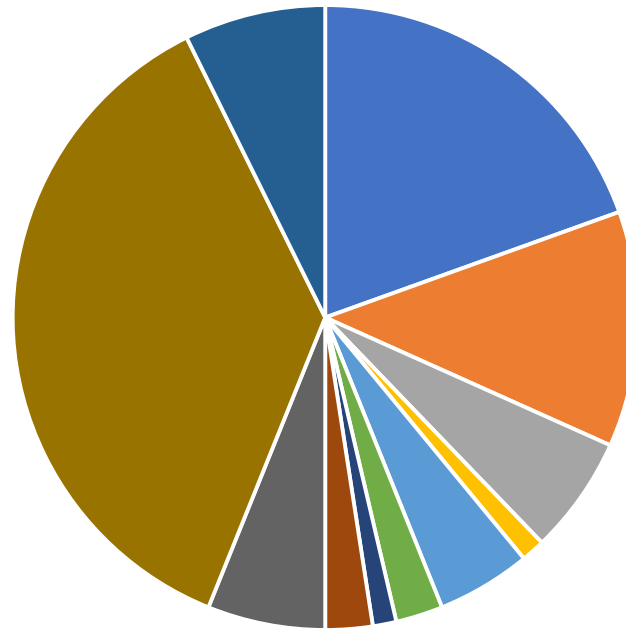
European activity of invasive procedures in CHD

- Increased from 5-10/million/year (1980) to 40-80/million/year (2018)
- Paediatric procedures (<18 years) increase slowly
- GUCH procedures (>=18 years) grow rapidly, will overtake in 5-10 years
- Approximately 2/3 interventional



Types of procedures

CHD procedures



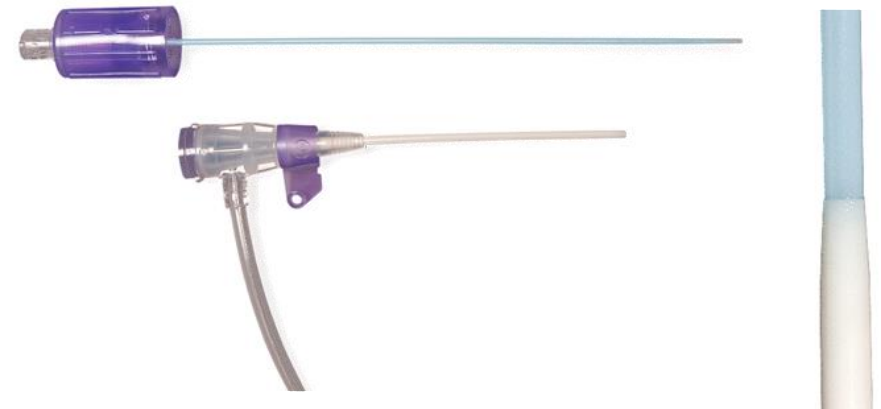
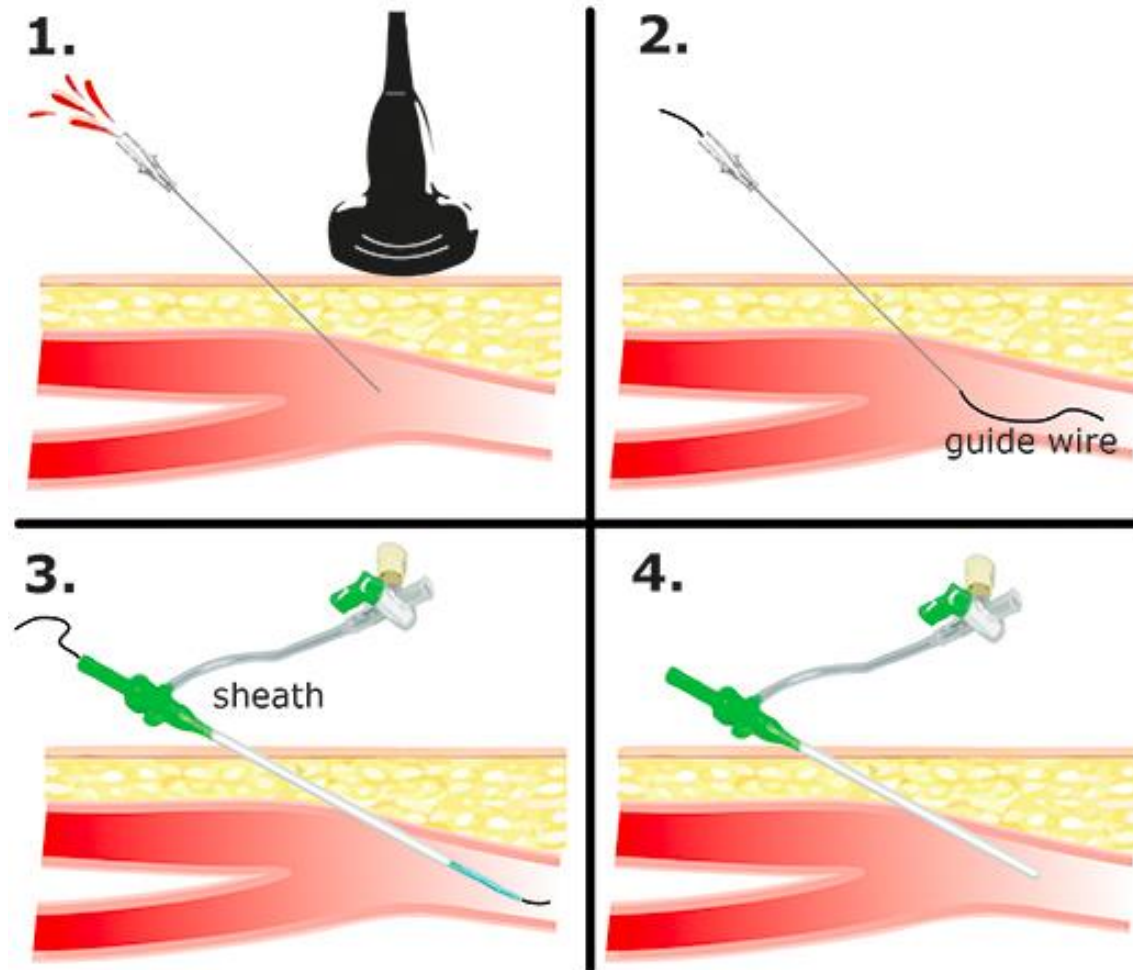
■ ASD ■ PDA ■ CoA ■ VSD ■ P-valvotomy ■ PA stenosis ■ A-valvotomy ■ Septomstomy ■ TPVI ■ Diagnostic ■ Other

Regional variation – large but declining

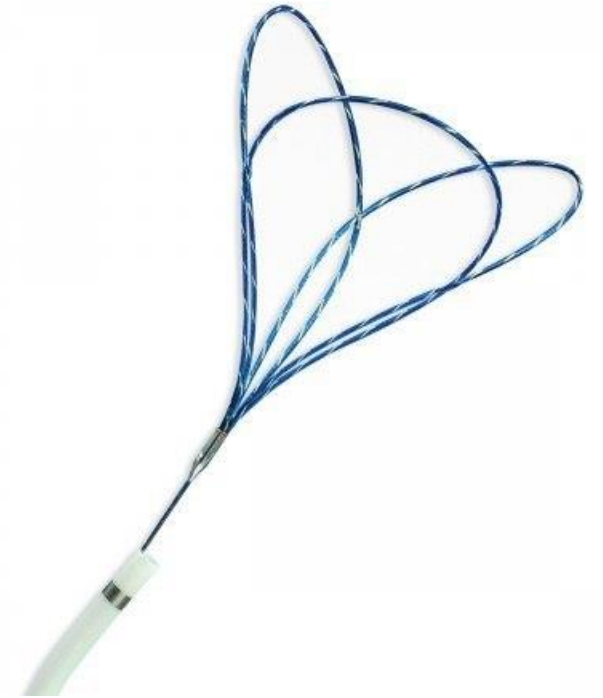
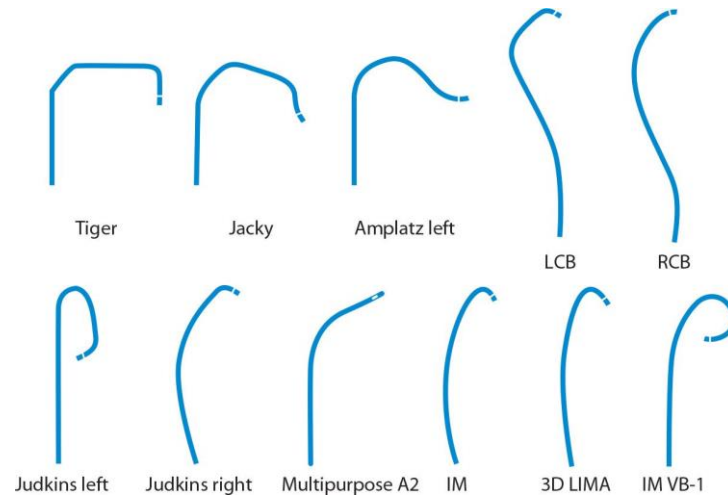
- Higher number of VSD-closures in Asia
- More complex procedures in some centres – surgeons influence
- Later adoption of transcatheter valve procedures in some countries
- Cost of equipment and devices still important
 - Example ICE



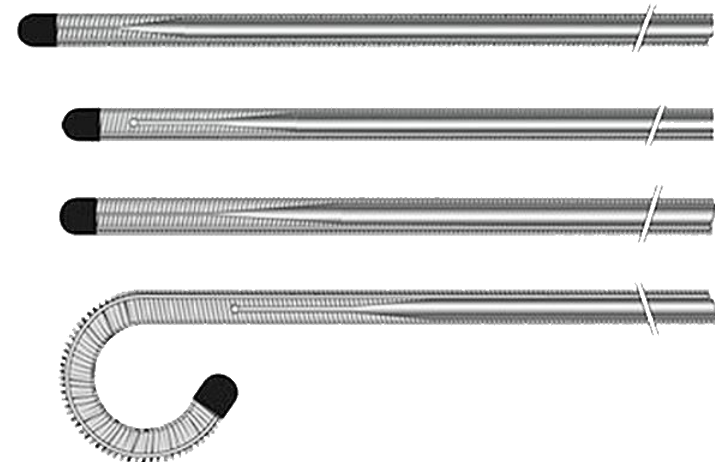
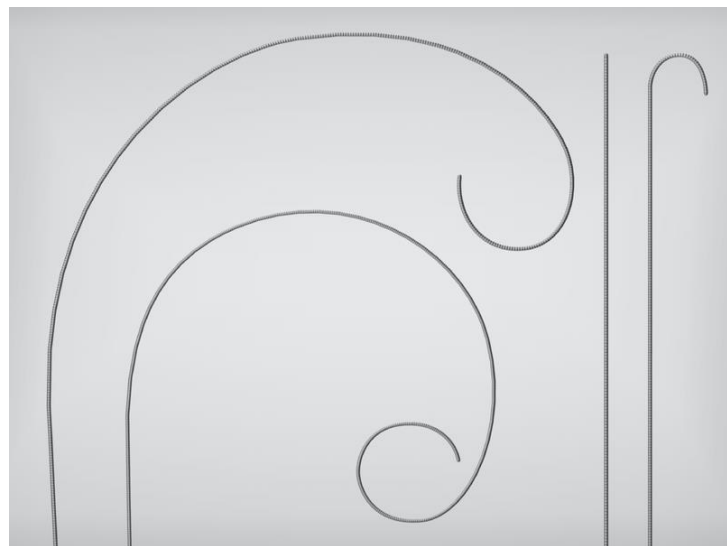
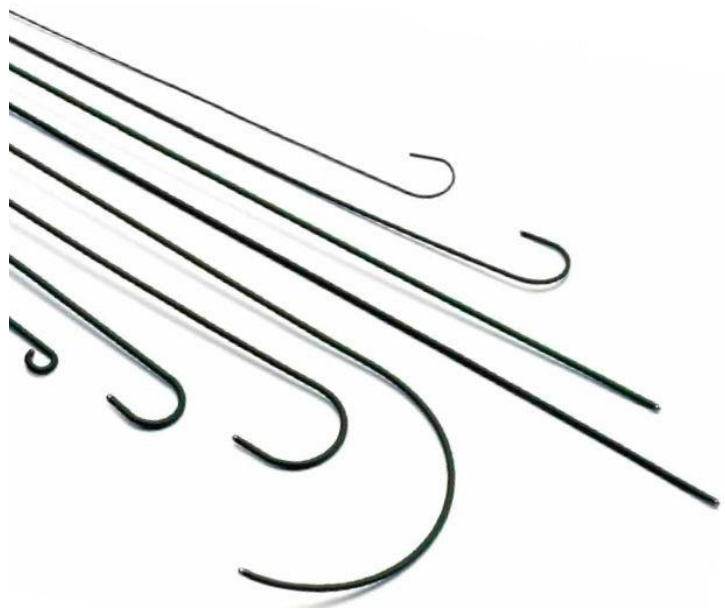
Vascular access



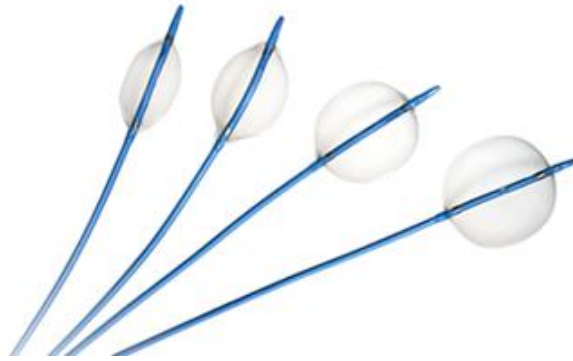
3.3Fr systems



Catheters

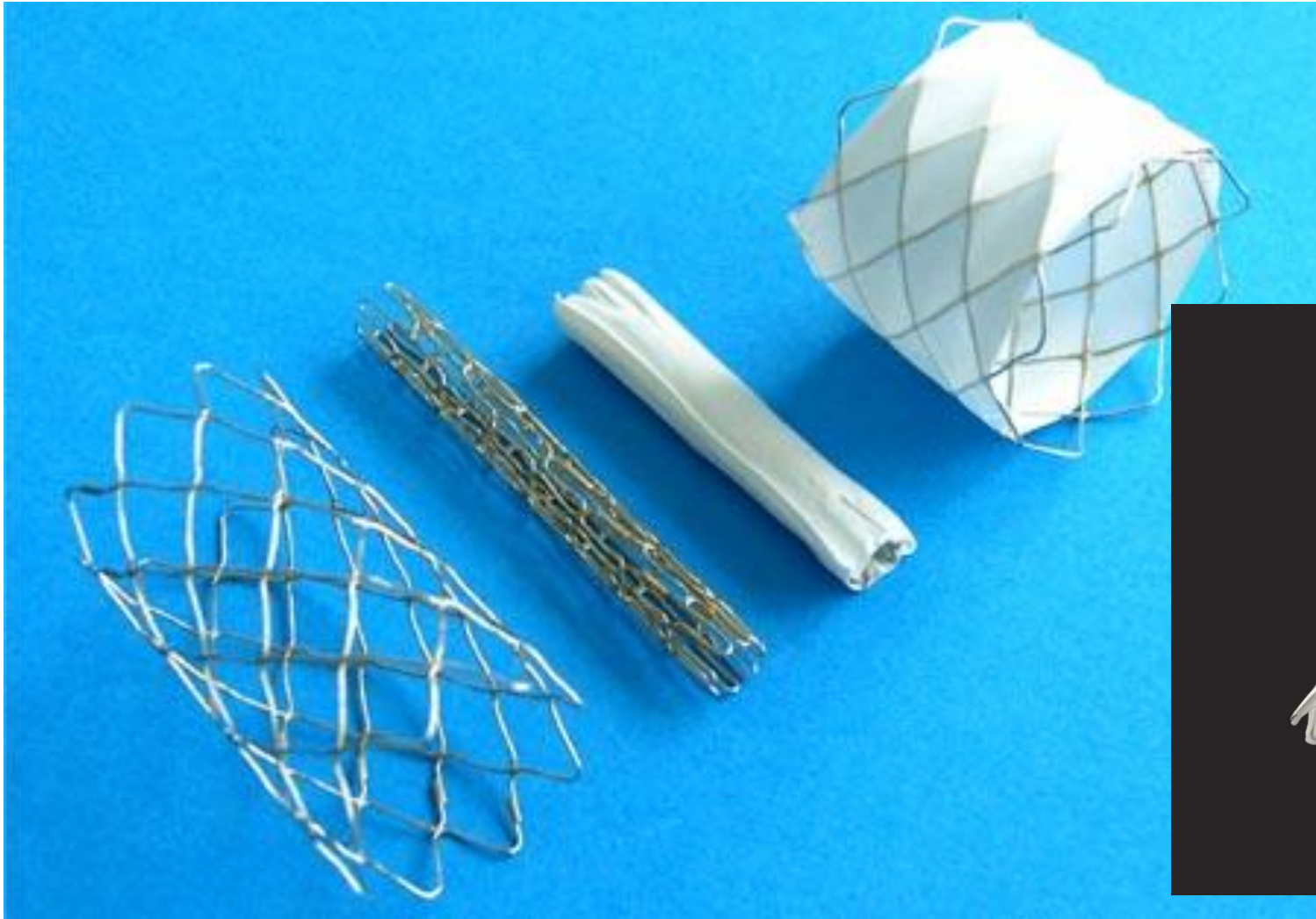


Wires – thickness, stiffness, length, hydrophil+/-

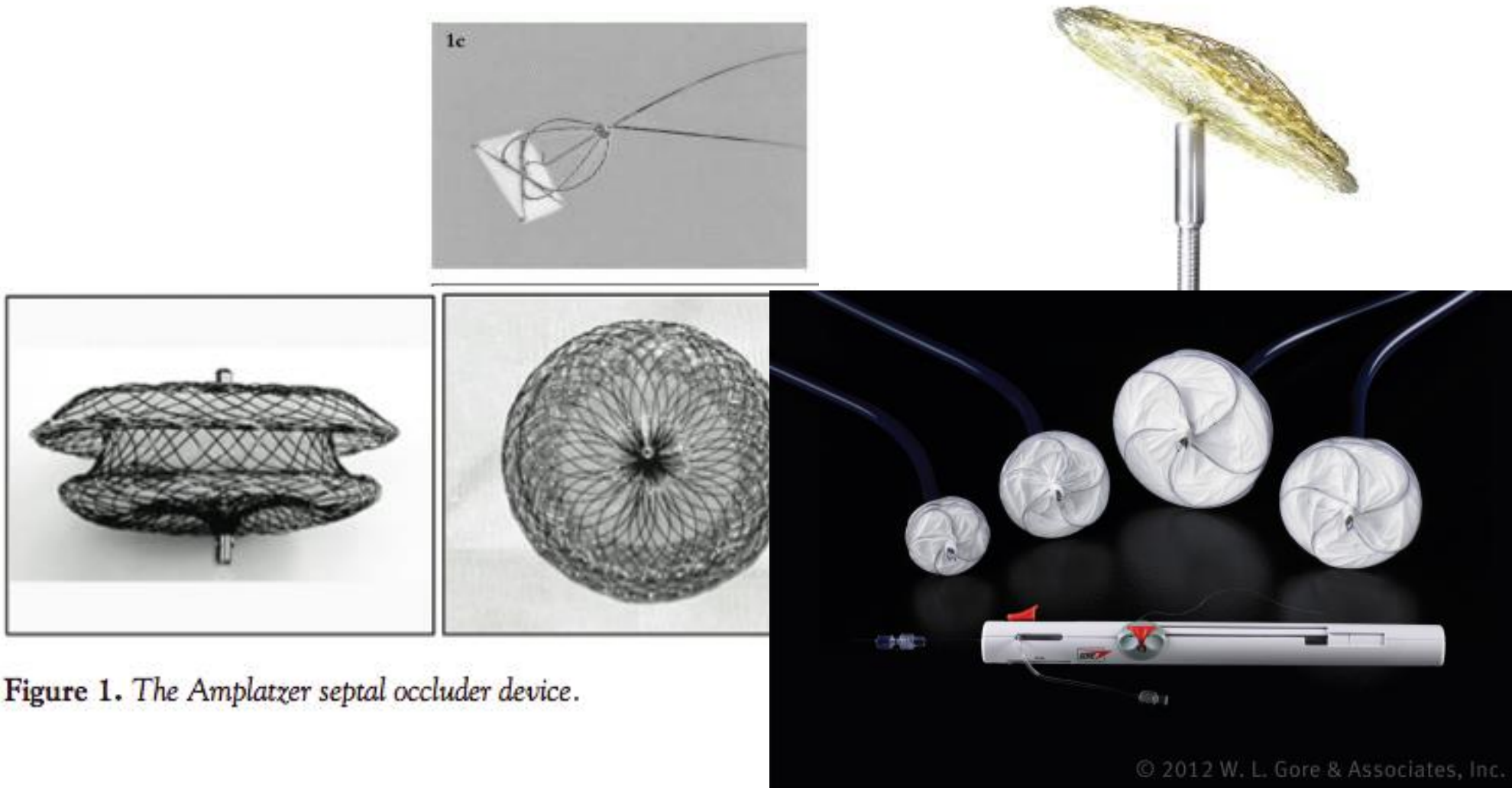


Balloons – diameter, length, compliance

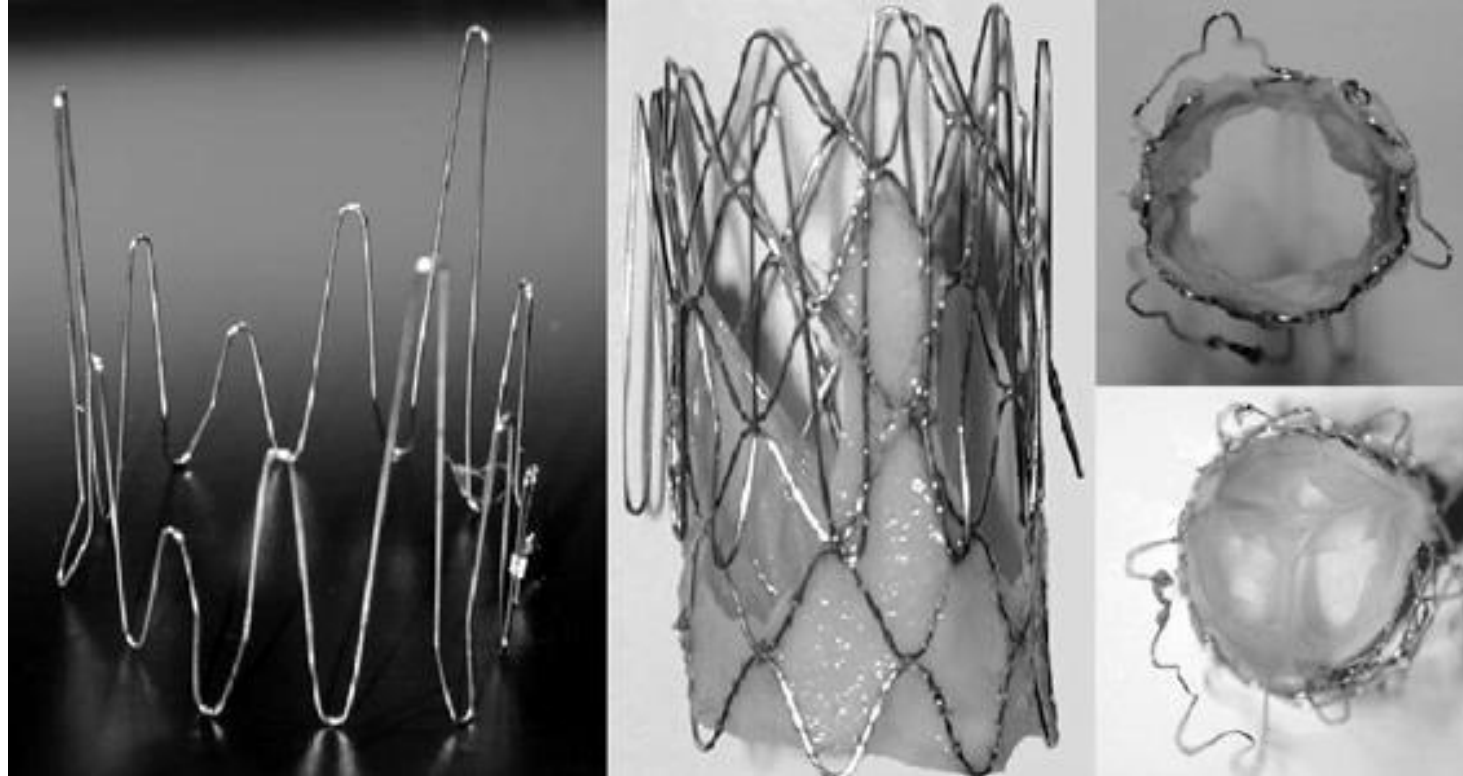
Stents – diameter, length covered/bare

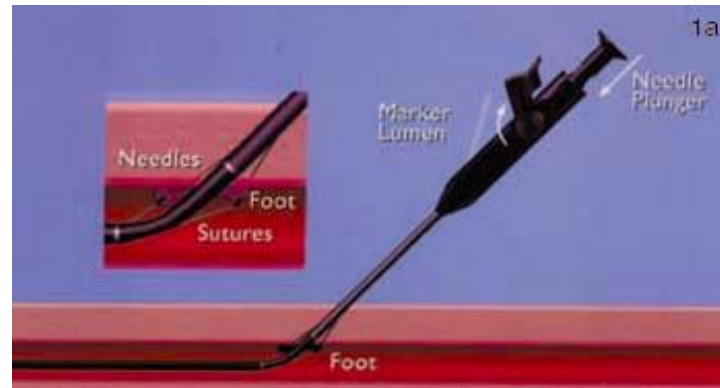


Closure devices - size, shape, material



Valves





Vascular closure

First use in
man 2000

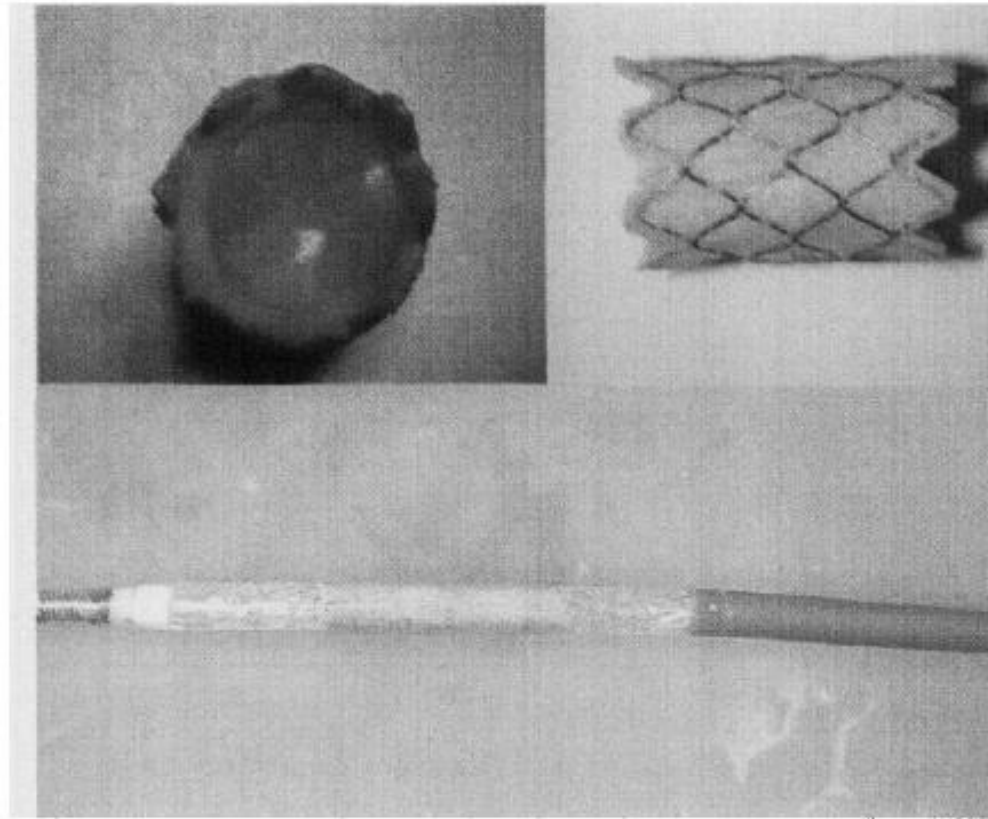


Figure 1: Valved stent

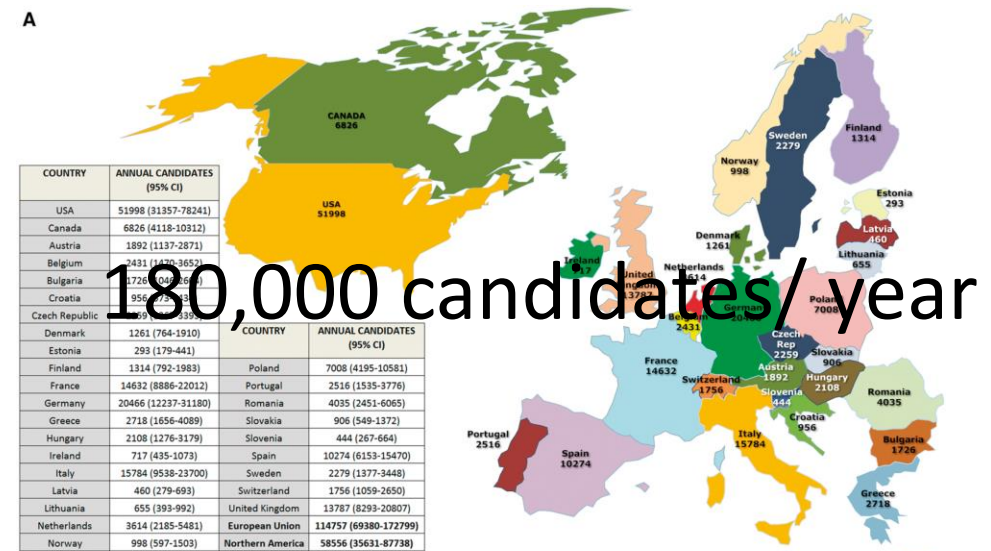
Upper left: closed valve mounted in the stent. Upper right: profile of the valved stent before compression. Below: valved stent in the delivery system.

TPVI

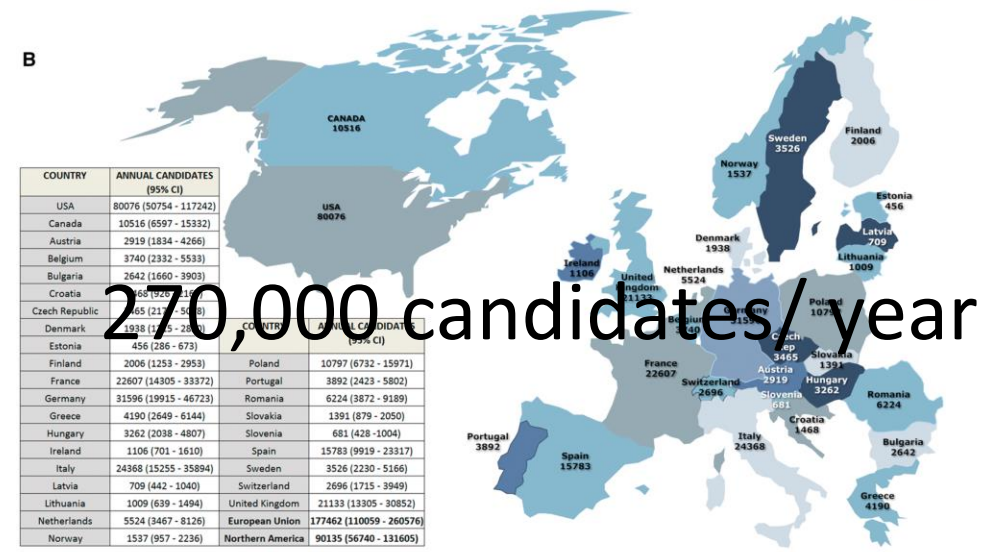
- First implant 2000
- CE mark in 2006
- FDA approval 2010
- Approx. 11,000 implanted totally

TAVI

A



B



The Melody[®] valve

- Initial indication – strictly RV-PA conduits
- Developed specifically to be positioned in a tube
- Not durable enough for moving/contracting surroundings
- Intended to postpone need for re-operation



Longevity of the Melody valve

Fig. 1 Graft survival : freedom from explant or redo PPVI

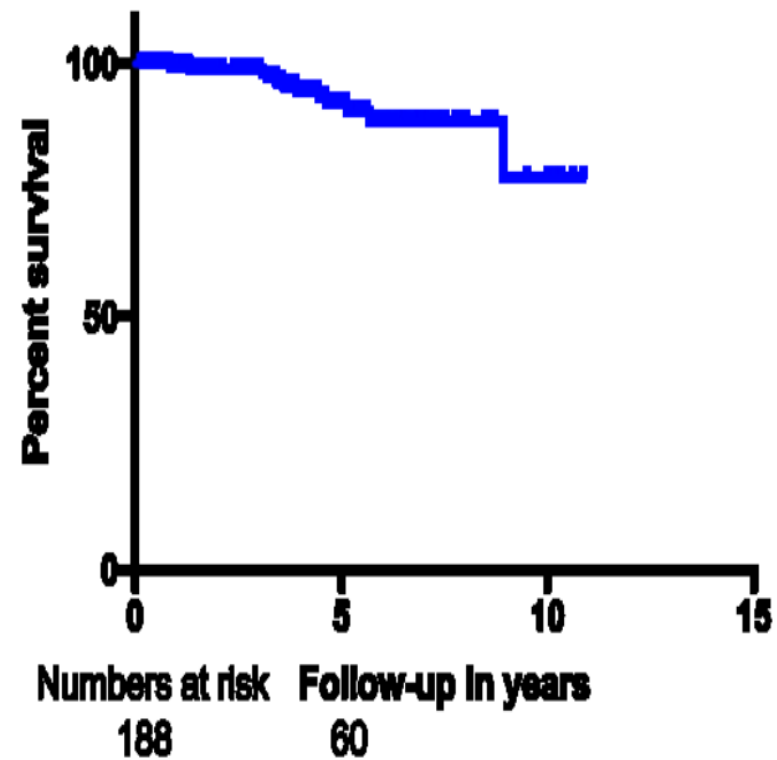
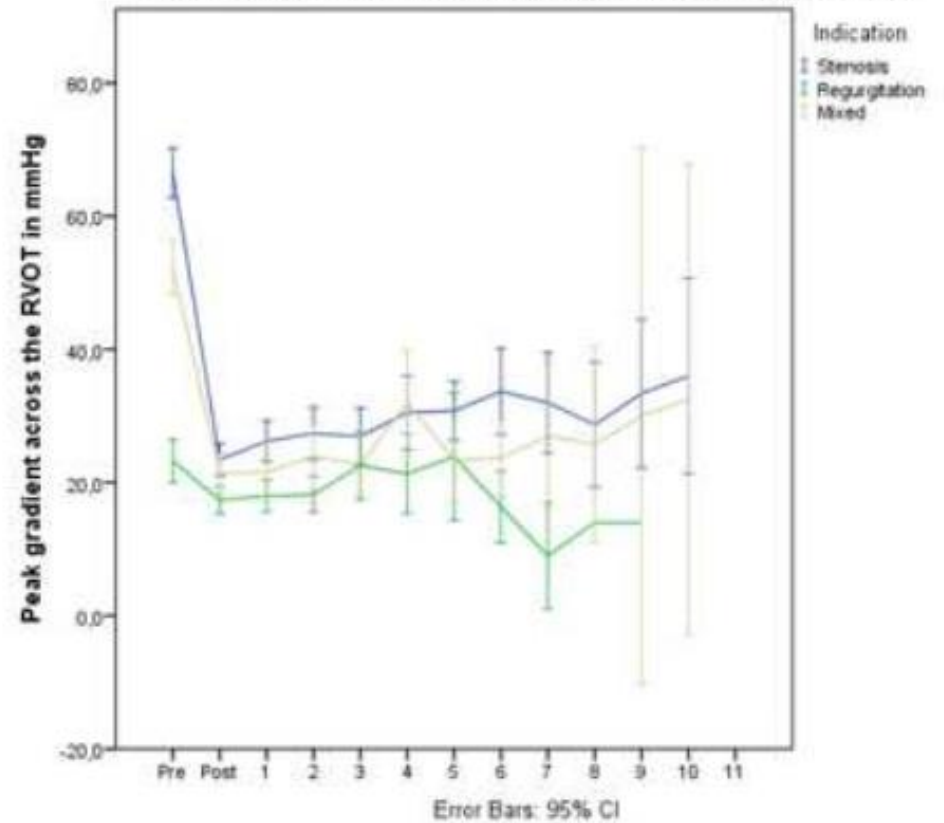


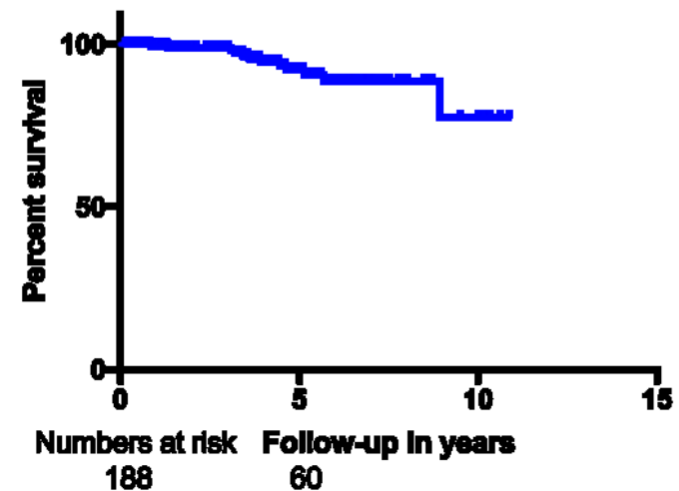
Fig2. Evolution of peak gradient across the RVOT after PPVI



Also feasible in
non-conduit
RVOTs.....

conduit type	native or patch	61
	homograft	98
	Contegra®	23
	Hancock®	1.0
	Freestyle®	3

Fig. 1 Graft survival : freedom from explant or redo PPVI



But still limited to size of 18-22mm...

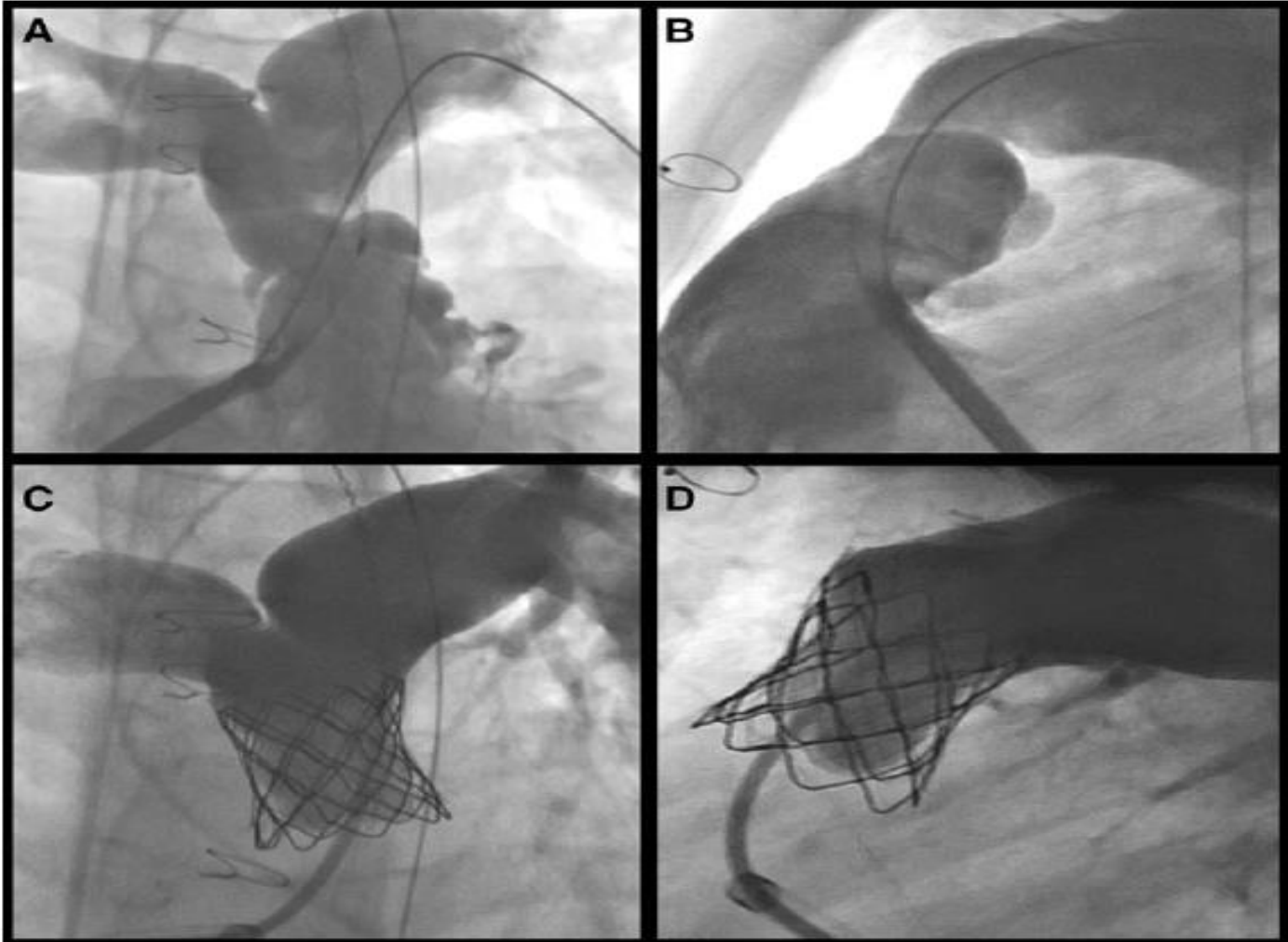
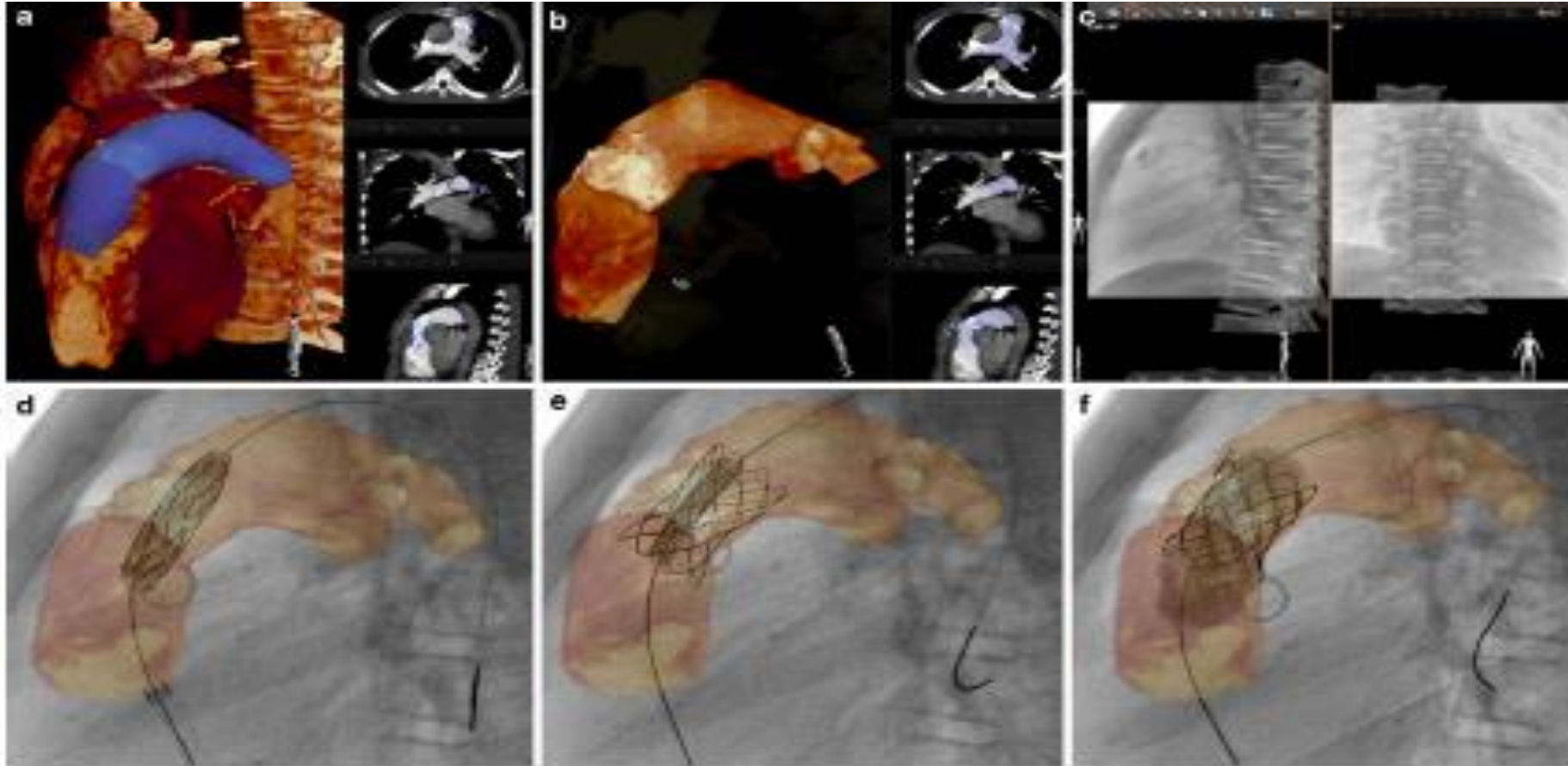
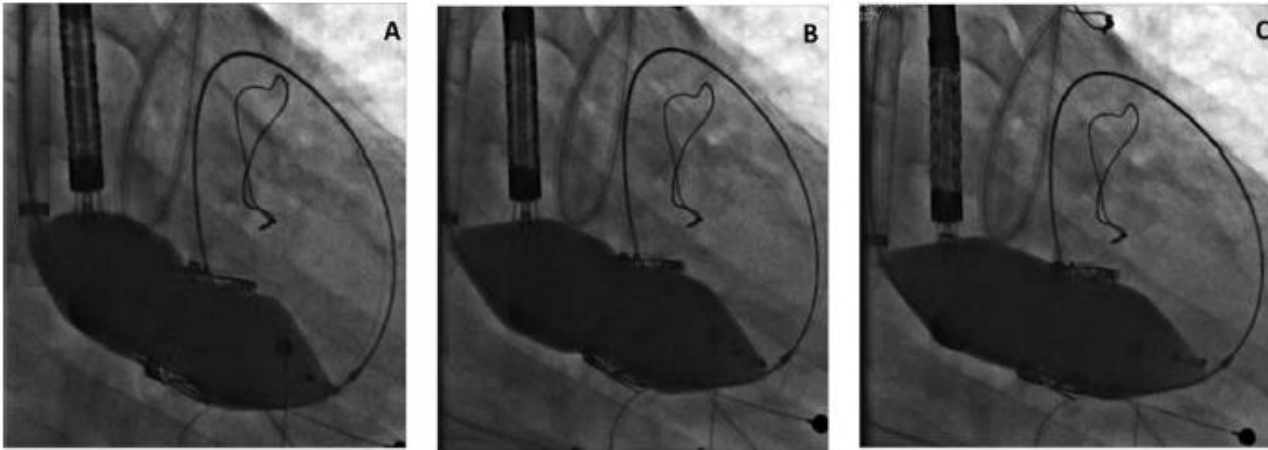


Table 1. Procedural Characteristics

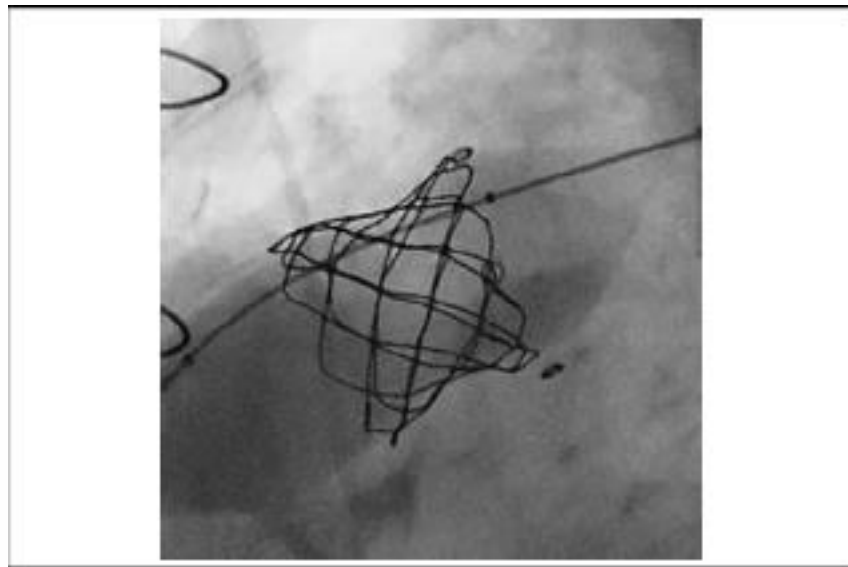
Balloon sizing prior to TPV implant	30/31	97%
RVOT pretest placed prior to TPV implant	22/31	71%
Pretest type		
Palmaz	19/22	86.5%
Genesis XD	1/22	4.5%
EV3	1/22	4.5%
CCPS+Palmaz	1/22	4.5%
TPV deployment balloon delivery size		
18 mm	1	3%
20 mm	5	16%
22 mm	24	77%
24 mm*	1	3%
Postdilation performed	5/31	16%
Postdilation balloon size	22–24 mm	

Advanced fusion imaging helps





Brown Cath and cardiovasc interv 2016



Cabalka J Thorac Cardiovasc Surg 2018

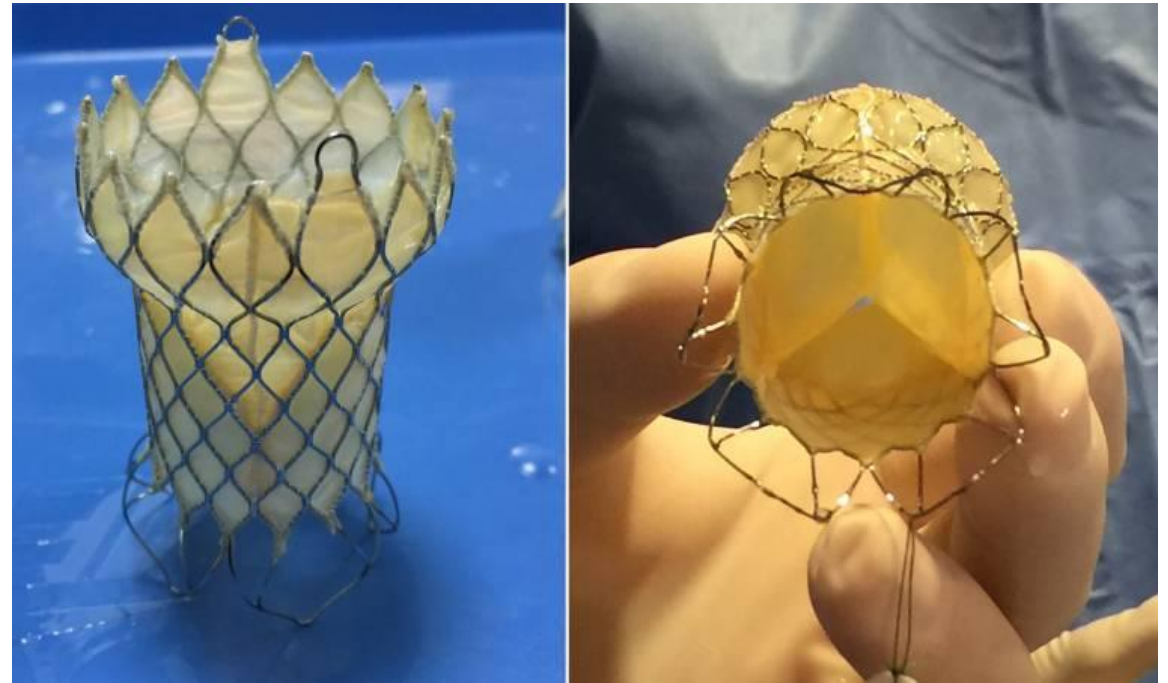
Advanced implantation techniques

- Cracking bioprosthetic valves takes 22-25 ATM
- Anchoring in stent in LPA
- Folding of MELODY valve
- In smaller children:
 - EDVi 150->130ml/m²
 - ESVi 90->80ml/m²
 - Jugular acces in patients <30
 - Sapien in patients <30kg very risky
- Long sheath for Sapien Valves
- Surgical and hybrid procedures

New valves

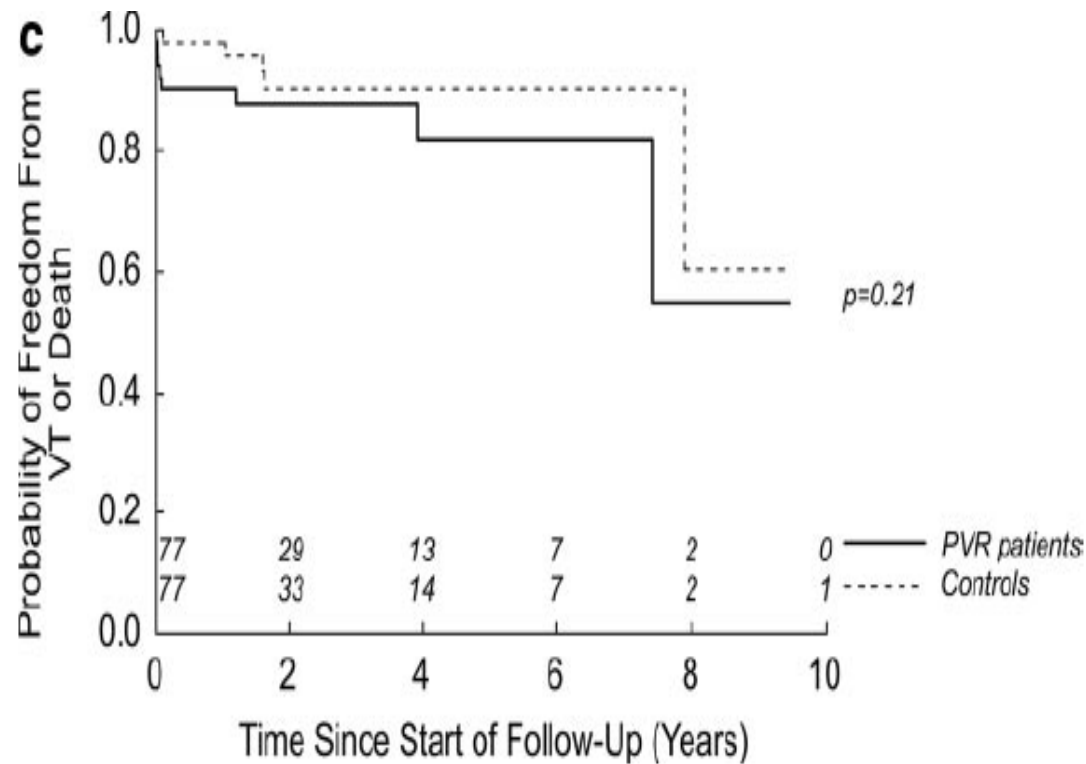


Harmony® (Medtronic)

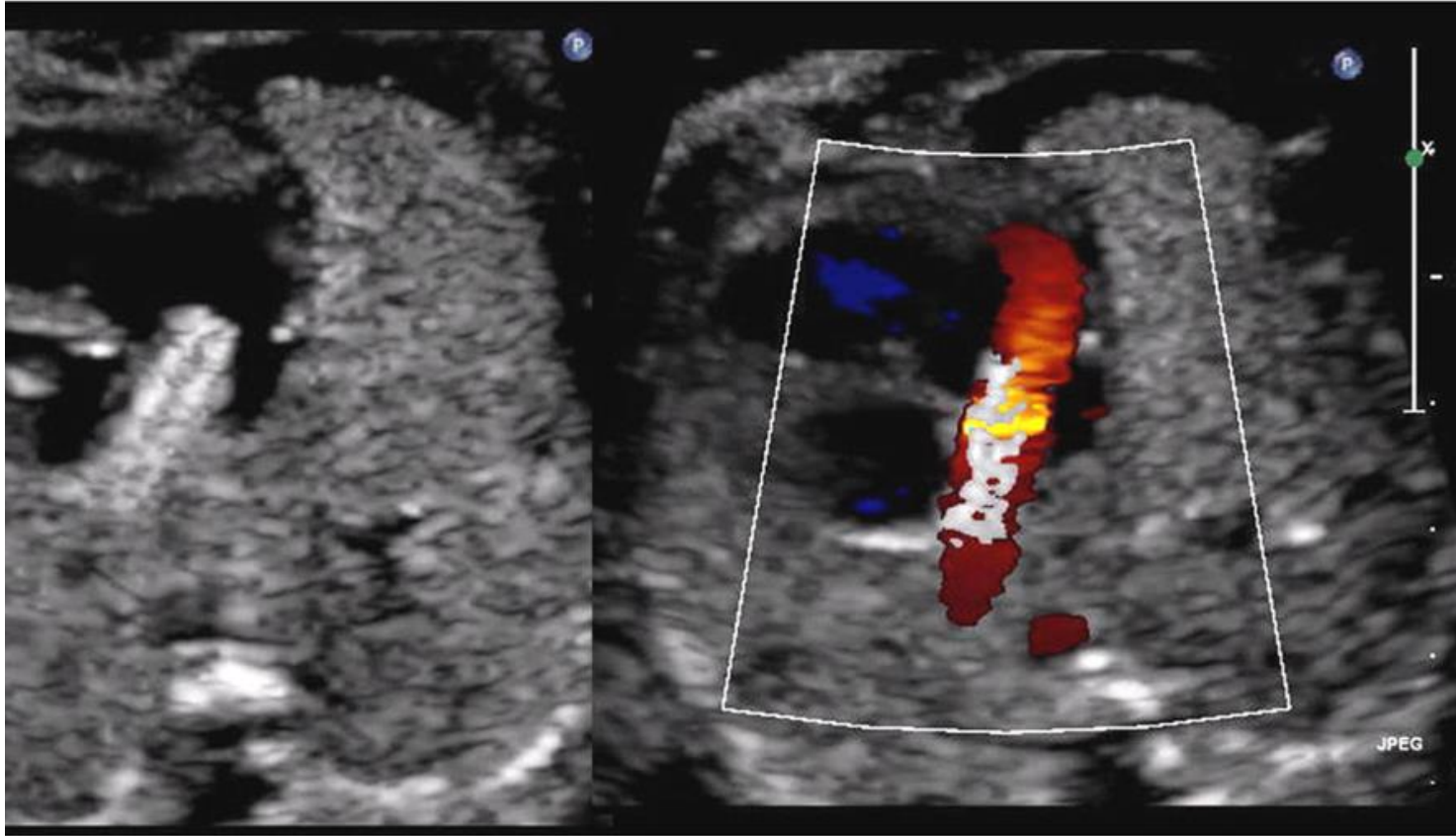


Venus P-valve® (Venus Medtech)

Are we re-valving too late?



- Uncertain effect in older patients
- RV remodelling may be irreversible
- RV fibrosis increasing with long-lasting PT



Other recent advances

- Hybrid – ductal stenting,..
- RVOT stenting
- Fetal interventions
 - AS
 - Restrictive foramen
- Cath lab Potts shunt
- Lymphatic duct closure

Failures and
blind roads

TCPC cath lab
completion

Hybrid?

Aggressive VSD-closures

Summary

- Interventions in congenital heart disease is growing and increasing in complexity
- Innovation in adult cardiology often come the congenital procedures
- GUCH population is growing
- New valves allow for use in large RVOTs will exclude surgery
-but surgeons still needed!