

Surgical Strategy in TAPVC

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Surgical Strategy in TAPVC

- What types of surgical approaches are used?
- What are the outcomes like?
- What is the rate of post-op pulmonary vein obstruction?
- Are there patients that we should consider not offering surgery?

What types of Surgical Approaches are Used?

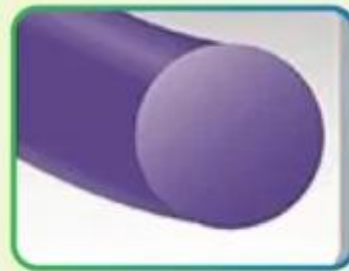
Principles:

-Good visualisation of the alignment between the pulmonary vein confluence and the left atrium to avoid a kink or distortion.

-Try not to cut into the origins of the pulmonary veins themselves

-Use a PDS suture to minimise scarring (loses 50% of its tensile strength within 6 weeks)

Absorbable Sutures



Monocryl (Poliglecaprone 25)

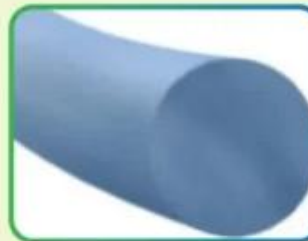


Vicryl (polyglactin 910)



PDS (Polydioxanone)

Non-absorbable sutures



Polypropylene



silk

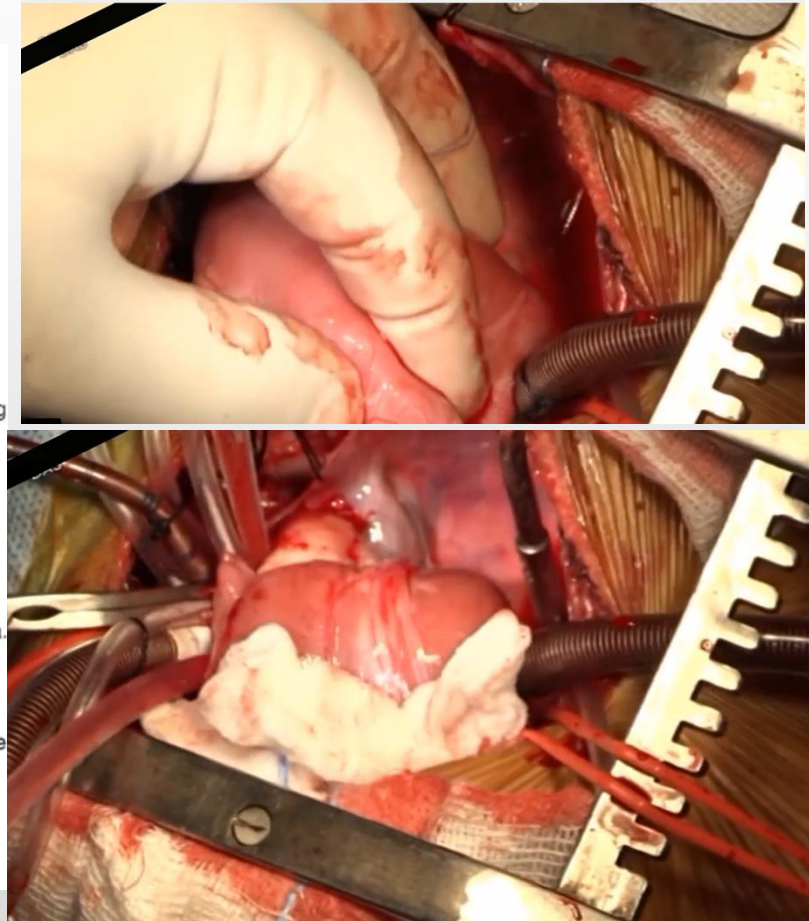
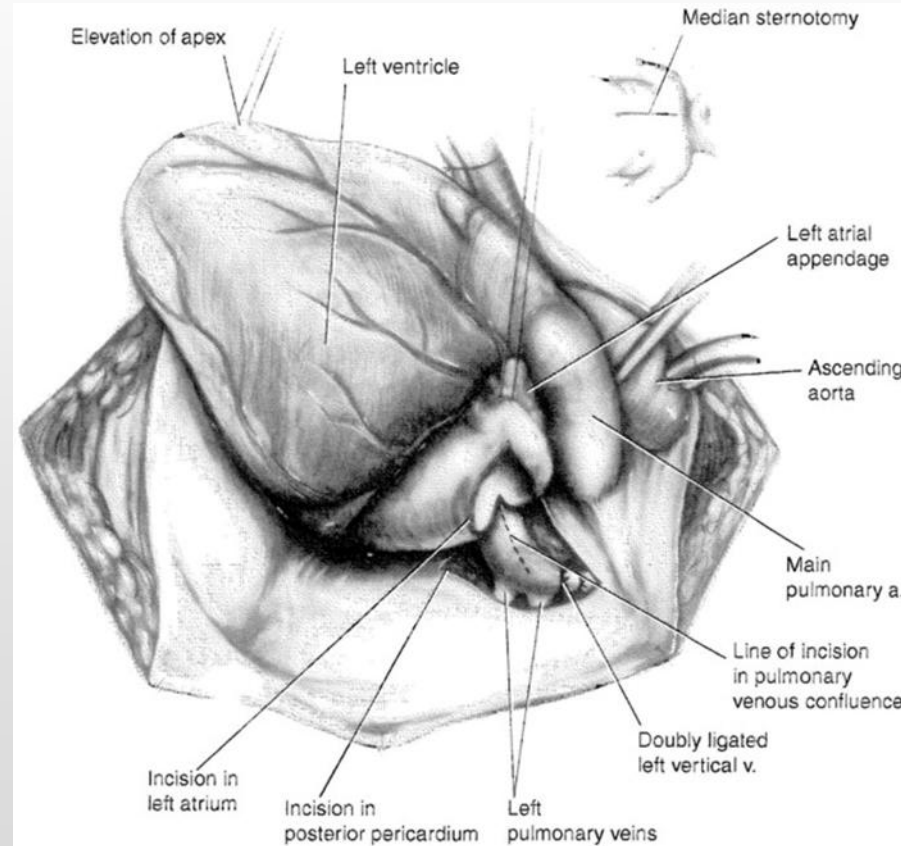


Monofil Nylon/Polyamide

What types of Surgical Approaches are Used?

Lateral approach.

-Apex of the heart is pulled up out of the pericardium and rotated into the right pleural cavity.

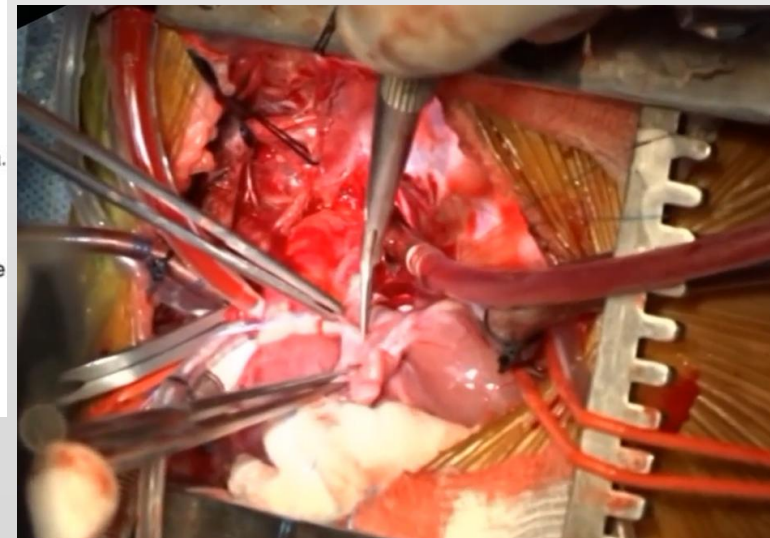
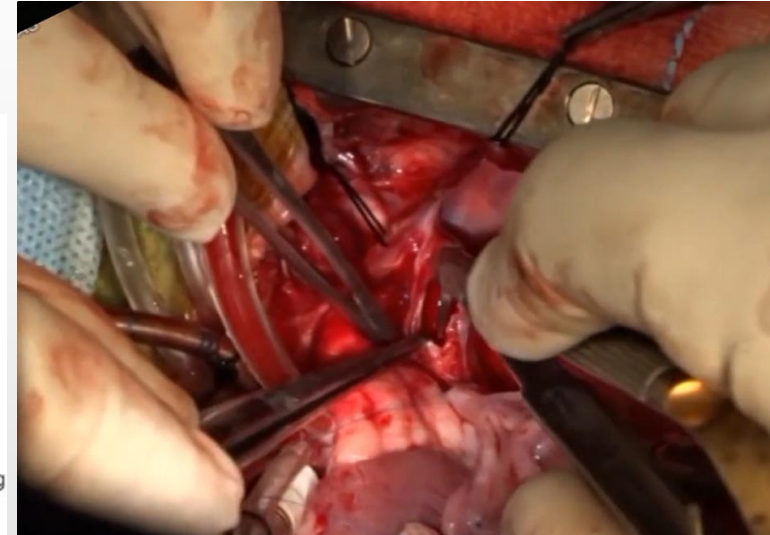
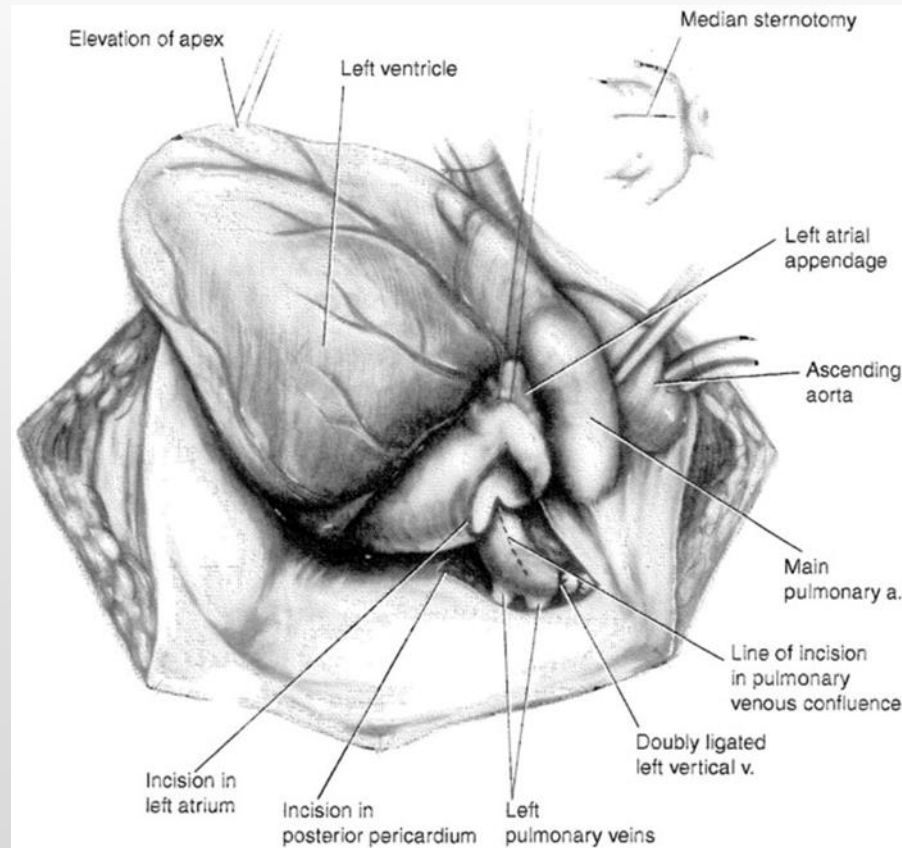


What types of Surgical Approaches are Used?

Lateral Approach.

- Incision in the pulmonary vein confluence but avoid the origins of the pulmonary veins.

- Incision in the posterior left atrium up into the base of the left atrial appendage.



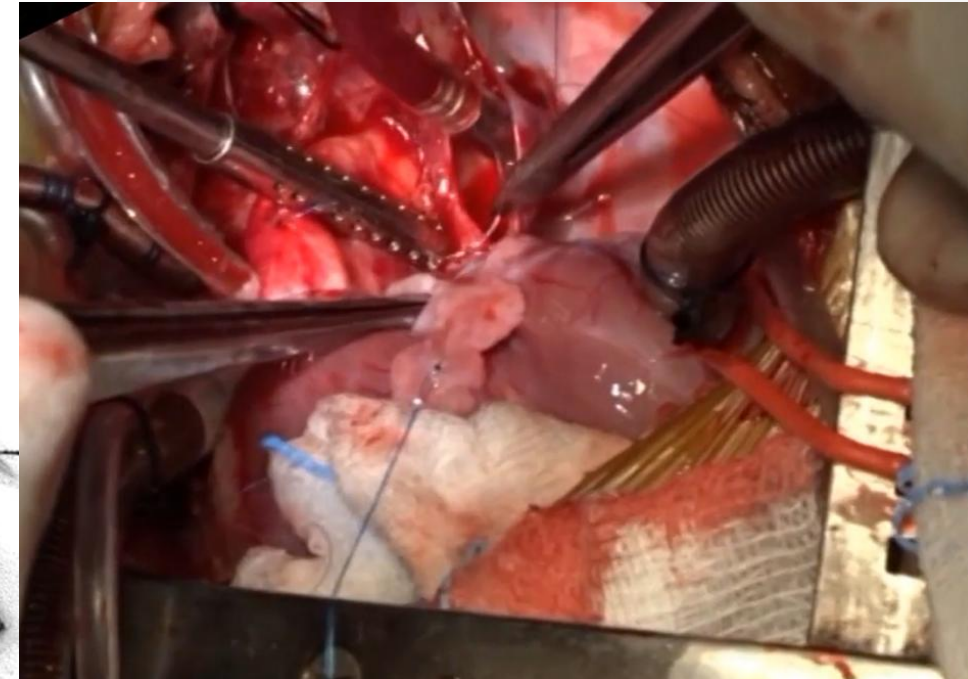
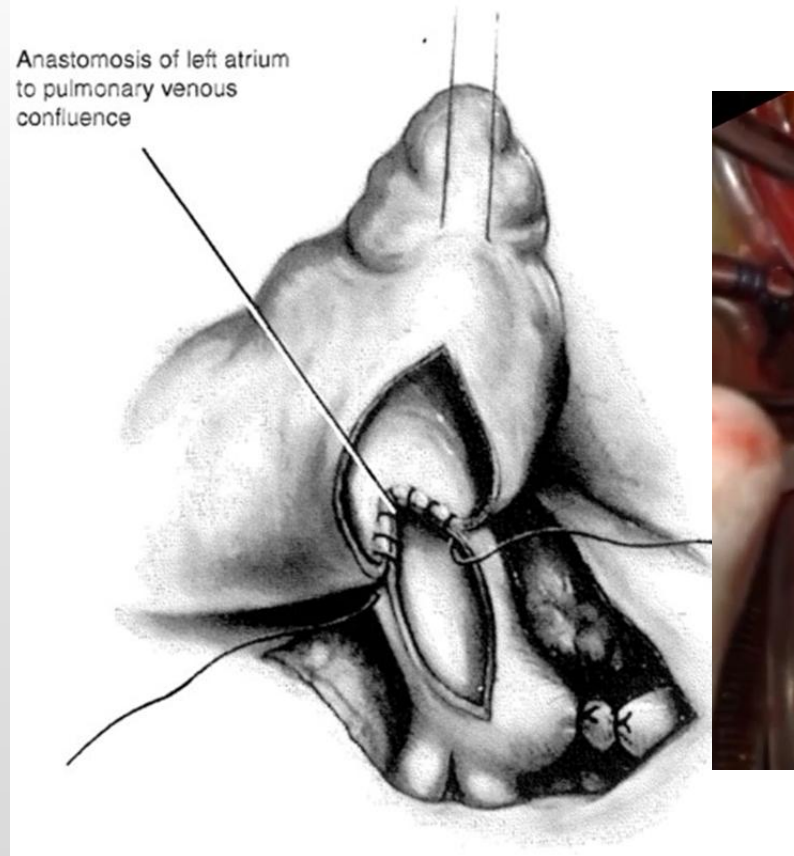
What types of Surgical Approach are Used?

Lateral Approach.

- Anastomose using PDS suture from right side of confluence to base of left atrial appendage.

- Lay the heart apex back in the pericardium.

- Open the right atrium and visualise the anastomosis and then close the ASD.



What types of Surgical Approach are Used?

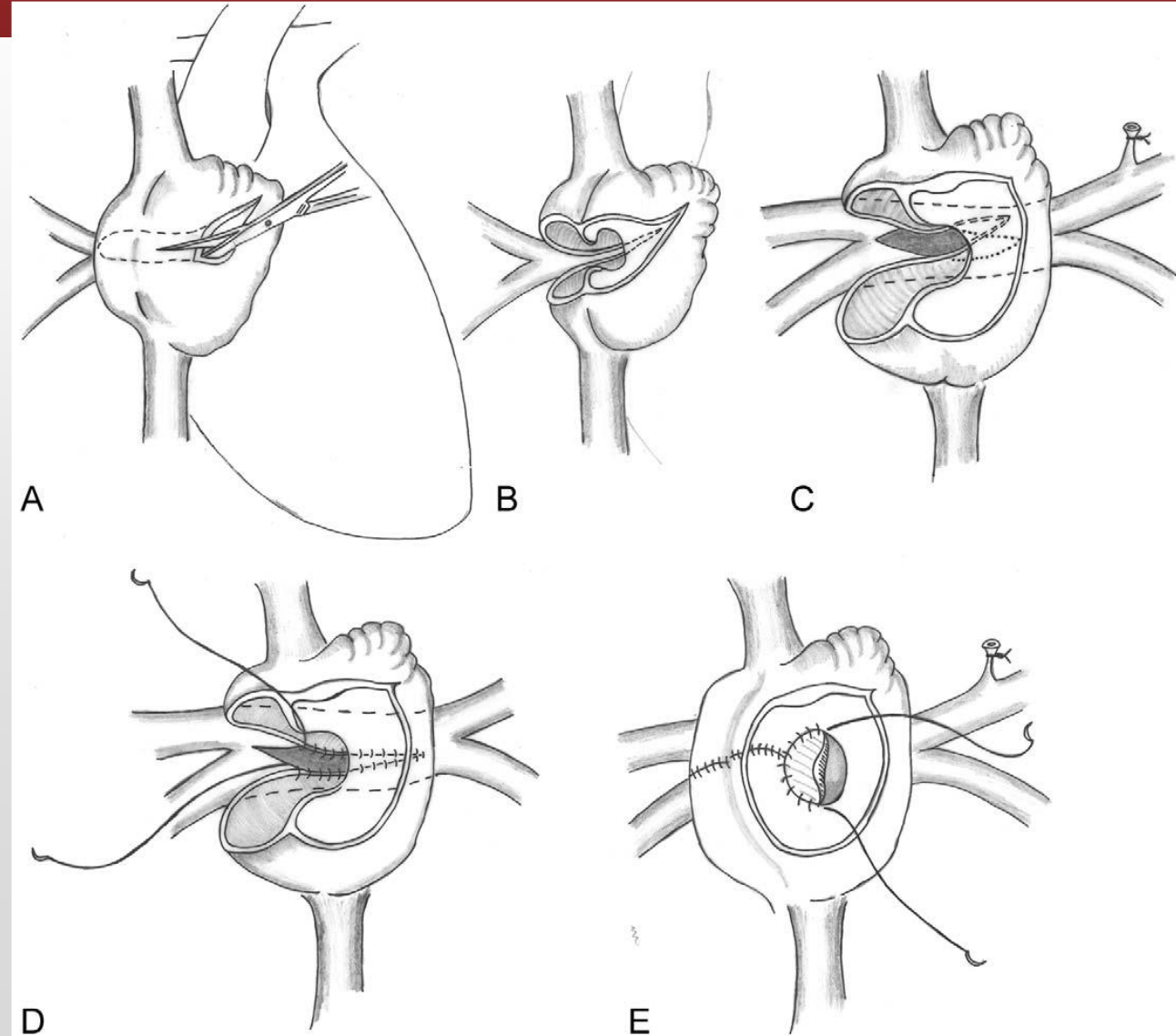
Trans-septal Repairs

-Approaching the anastomosis via the right atrium and atrial septum with the heart in it's normal anatomical position(to avoid distortion of the confluence connection).

Various names:

-Hawkins repair (Right atrium via the ASD)

-Shumacker repair (Trans-septal repair)



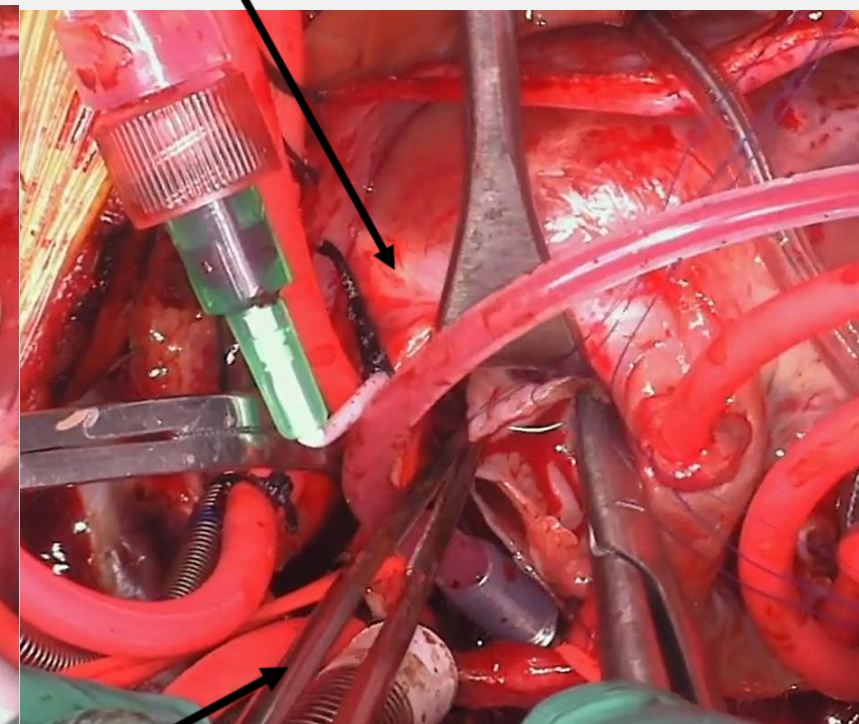
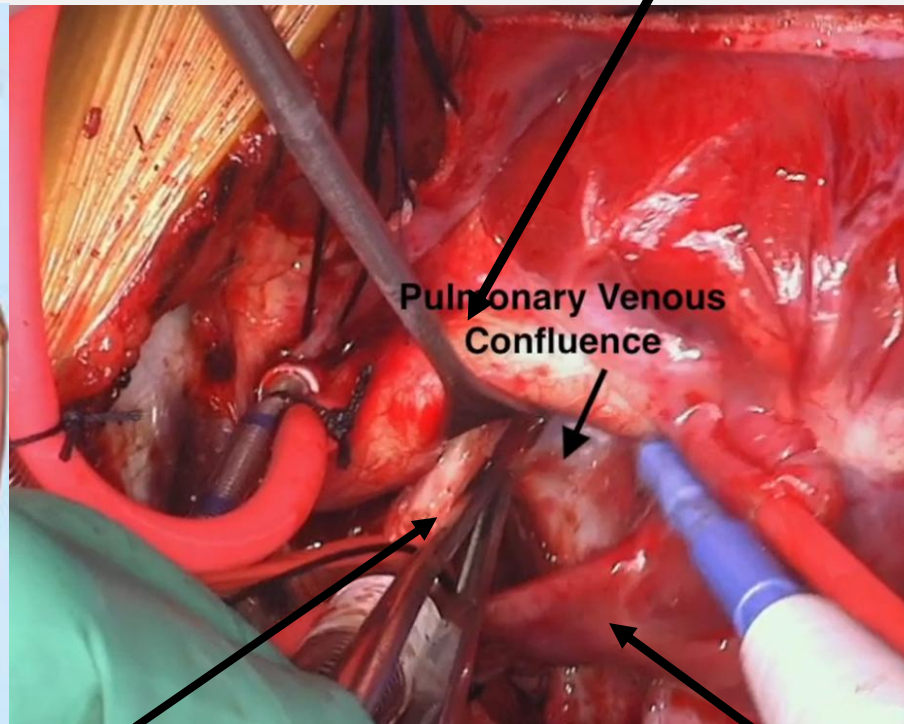
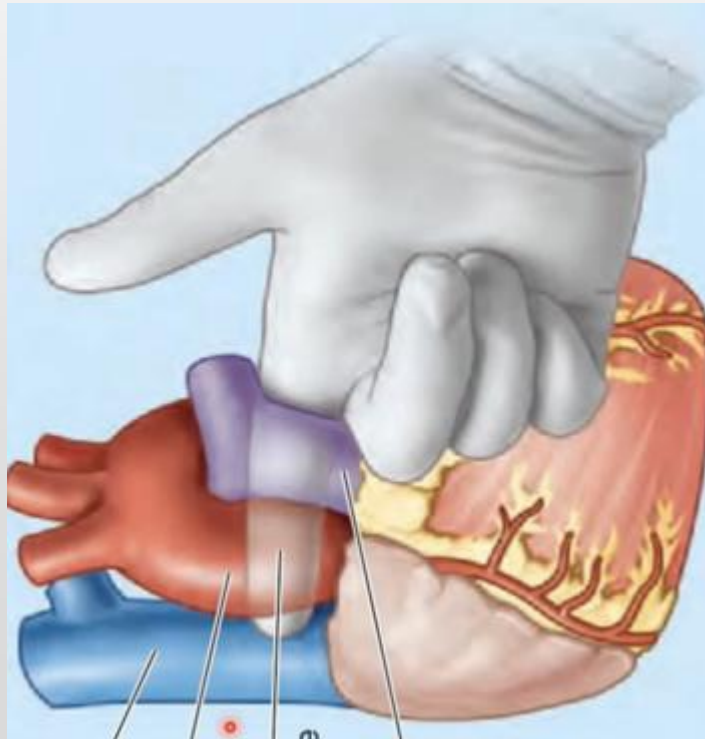
What types of Surgical Approaches are Used?

Superior approach for Supracardiac TAPVD

-Tucker's repair,

Ann Thorac Surg 2018 105:1429-35

approaching the horizontal supracardiac TAPVD confluence
via the transverse sinus.



Pulmonary artery

SVC

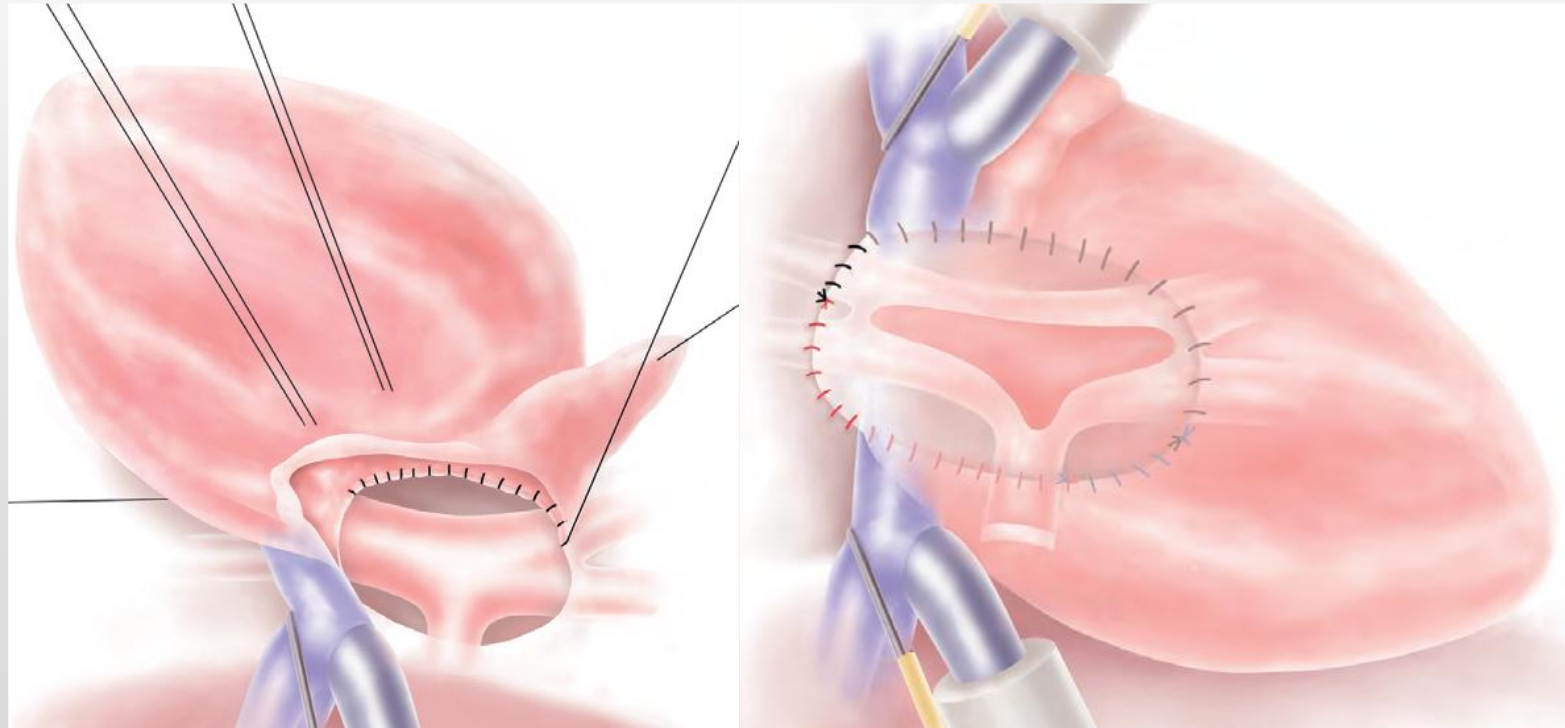
What types of Surgical Approach are Used?

Sutureless Repair

What does Sutureless Repair mean?

No sutures used directly on the pulmonary veins or confluence.

Wide anastomosis of posterior pericardium to left atrium.



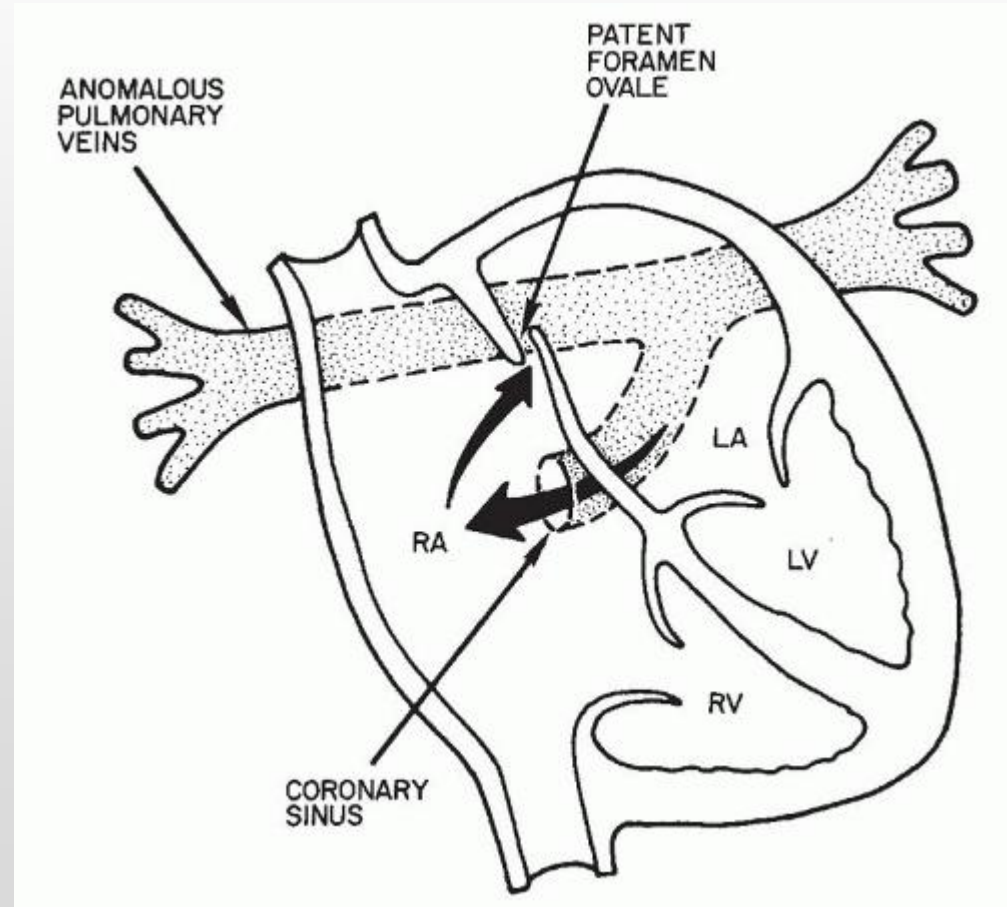
What types of Surgical Approach are Used?

Unroofing procedure for Cardiac TAPVD

Via the right atrium and the ASD:

Coronary sinus roof is opened back into the left atrium and excised.

ASD patch then closes the atrial septum leaving the coronary sinus fully on the left atrial side.



What types of Surgical Approach are Used?

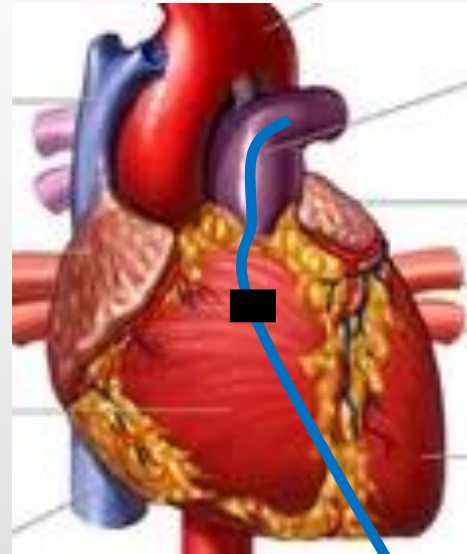
Post-op course may require:

Intra-cardiac pulmonary artery line

iNo

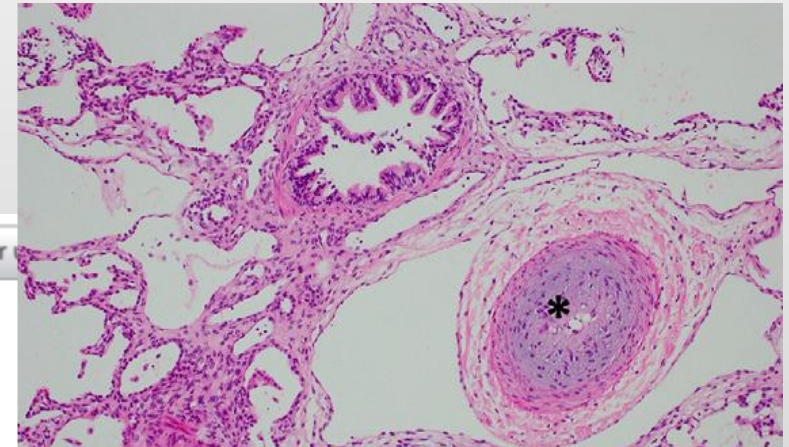
Delayed sternal closure

ECMO



175 neonates TAPVD repair
1973-2021

Pulmonary hypertension crisis in 12%
Survival lower in those who had a
pulmonary hypertensive crisis with
hazard ratio 4.9



59% who died had pulmonary
arterial hypertension histologically.

Outcomes of total anomalous pulmonary venous drainage repair in neonates and the impact of pulmonary hypertension on survival

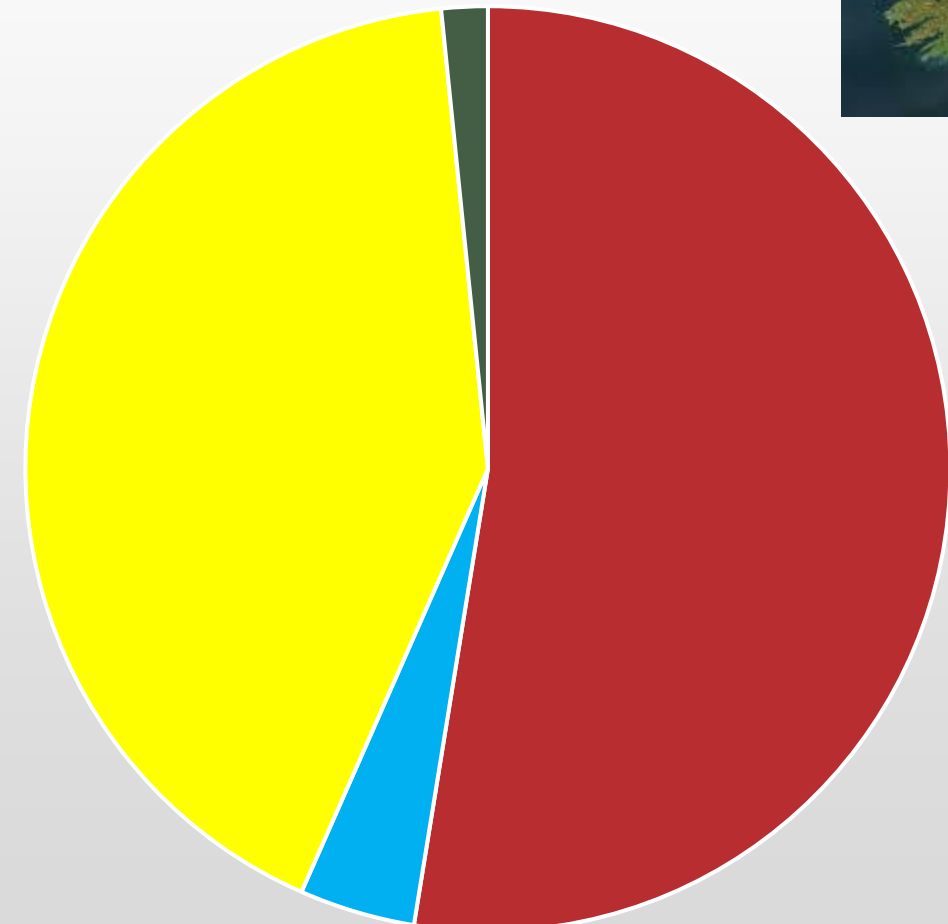
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What are the outcomes like?

Ireland



TAPVD type



■ Supracardiac ■ Cardiac ■ Infracardiac ■ Mixed

All TAPVD repairs 2010-2025

77 pts.

Mean(+/-SEM) age at repair 45 +/- 9 days

Mean weight 4.5Kg +/- 0.5

38% ventilated pre-op

What are the outcomes Like?

Ireland

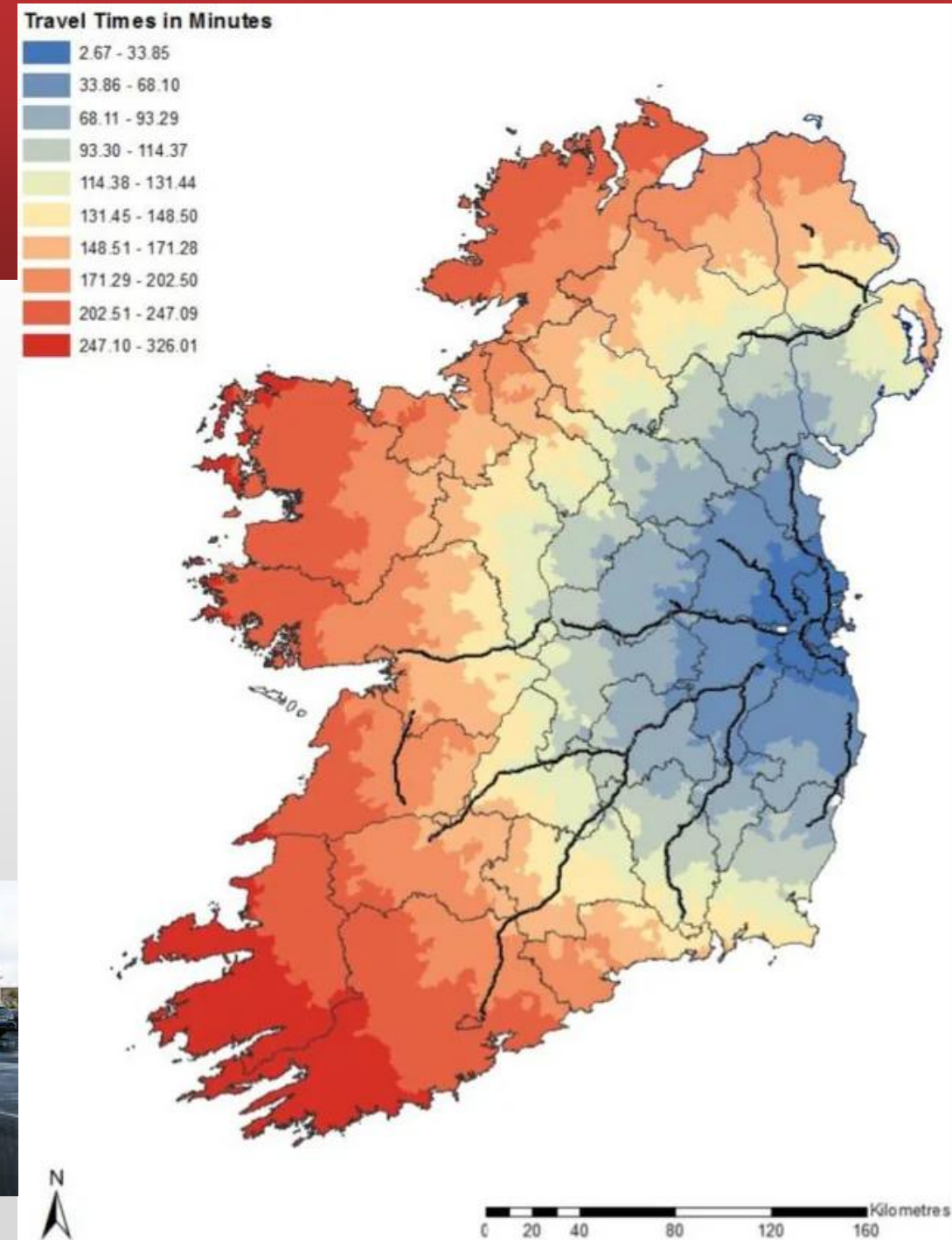


Surgical details and outcomes:

- Mean(+/- SEM) bypass time 110+/- 5 mins
- Mean(+/- SEM) X-clamp time 51 +/-2 mins
- 30% of repairs involved a period of Deep Hypothermic circulatory arrest
- Mortality rate 6.5%
- Number of days ventilated post-op 5.5 +/- 0.7 days
- Morbidity: ECMO 4%, Prolonged pleural drainage>7 days 8%,
New neurological injury 1.5%, AKI needing dialysis 1.5%

What are the outcomes like? Ireland

- Mortality in those ventilated pre-op – 14%
- Mortality in those not ventilated pre-op – 2%



What are the outcomes like? Melbourne, Australia?



All TAPVD repair 1973 – 2014

214 neonates and infants

Median age 18 days

7.9% early mortality

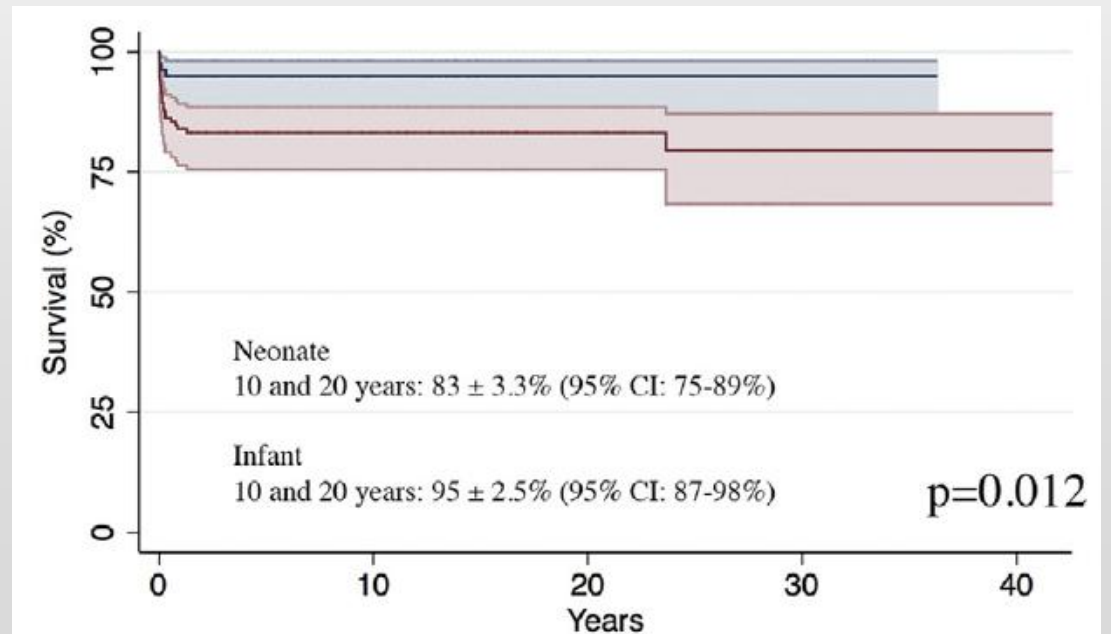
Hospital deaths for neonates remained unchanged over different eras from 1980's to 2014

Survival beyond 1 year is associated with excellent longterm survival.

Long-Term Outcomes of Total Anomalous Pulmonary Venous Drainage Repair in Neonates and Infants



Matthew S. Yong, MBBS, Nima Yaftian, MD, Sophie Griffiths, MD, Johann Brink, MD, Terry Robertson, MBBS, Luigi D'Orsogna, MBBS, Robert G. Weintraub, MBBS, Yves d'Udekem, MD, PhD, Christian P. Brizard, MD, and Igor E. Konstantinov, MD, PhD



What are the outcomes like?

UK, Ireland, Sweden



19 Paediatric Cardiac Surgery Units – UK, Ireland, Sweden

1998-2004

406 patients with TAPVD repair

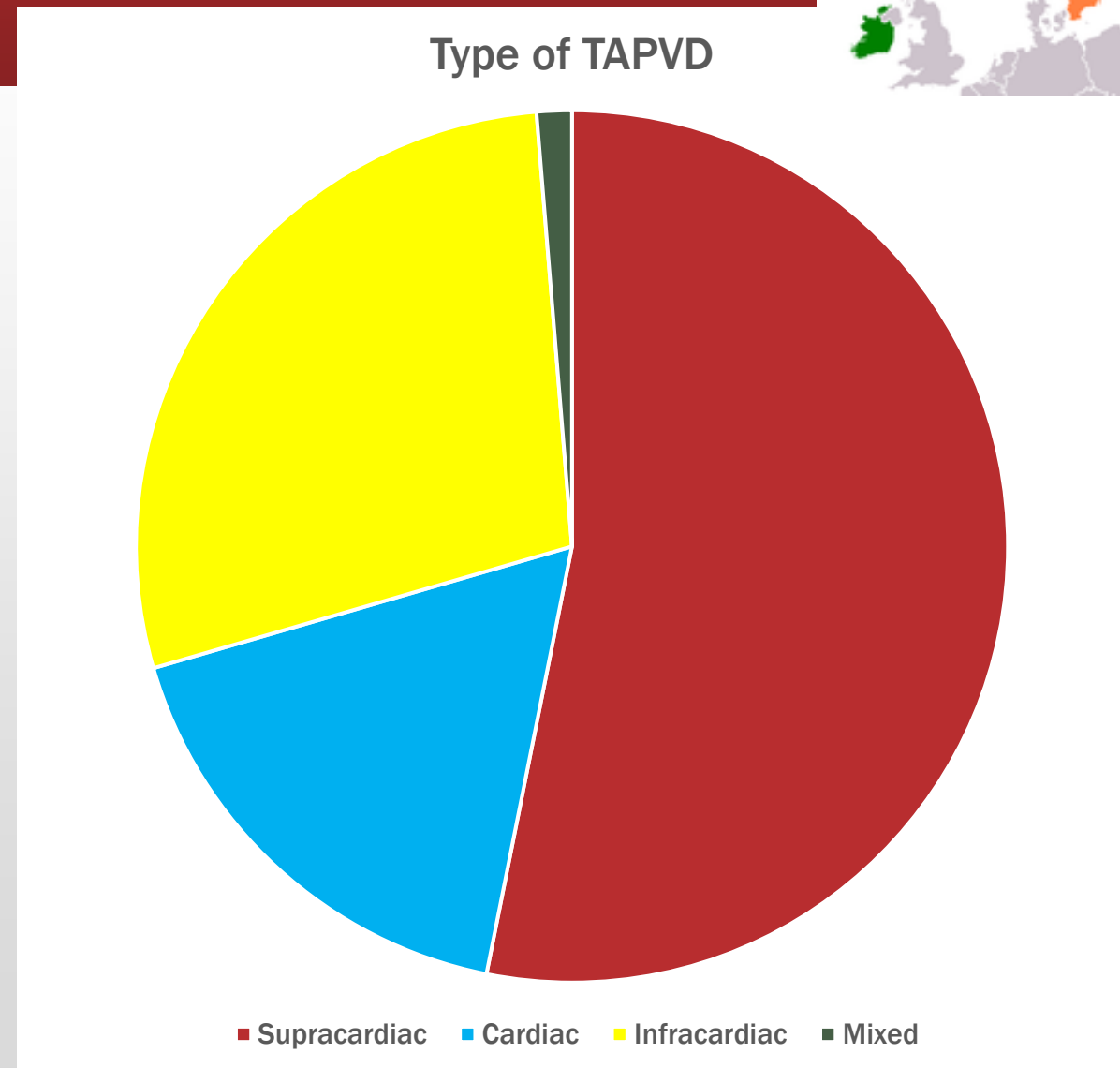
Median age at presentation 14 days.

14.3% early mortality

ECMO 4.7%

7.4% had a pulmonary hypertensive crisis leading to arrest or need for ECMO

Circulation 2010 122:2718-2726



What are the outcomes like?

Shanghai, China



Single centre, all neonatal TAPVD repair

2012-2020

241 patients

Median age at surgery 14 days

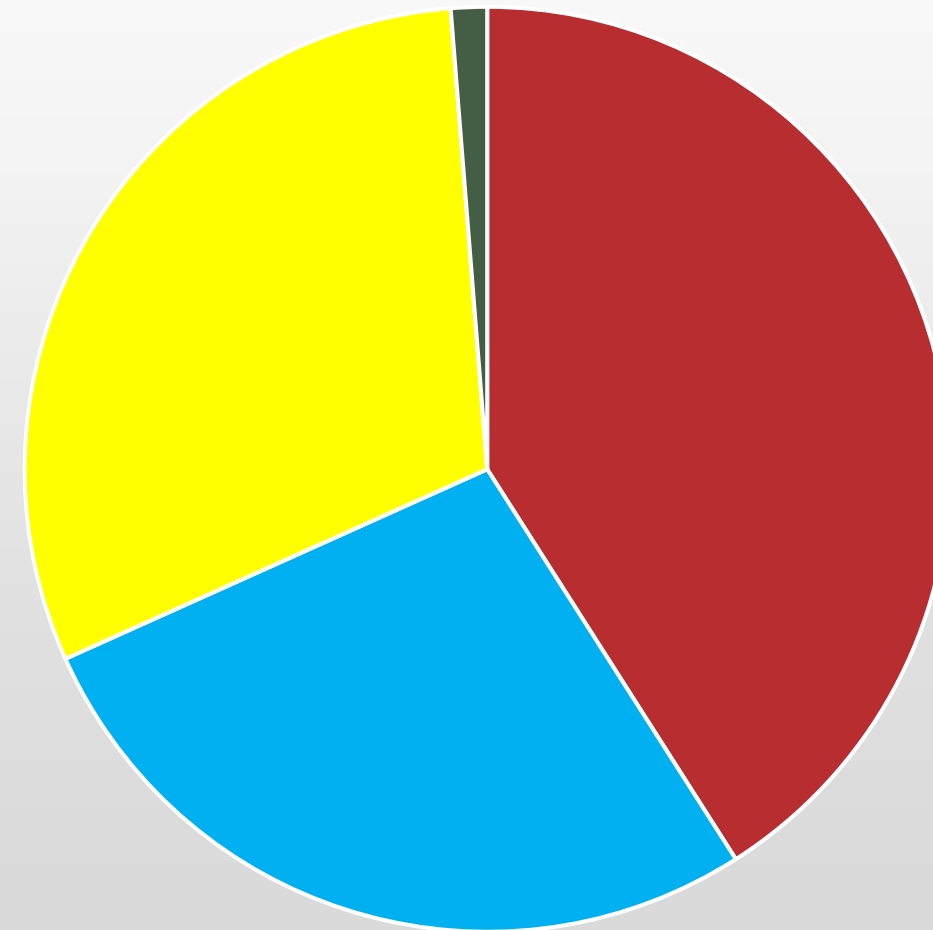
Median x-clamp time 43 mins

Median bypass time 85 mins

Post-op ICU stay 7 days

Early Mortality 10%

Type of TAPVD



■ Supracardiac ■ Cardiac ■ Infracardiac ■ Mixed

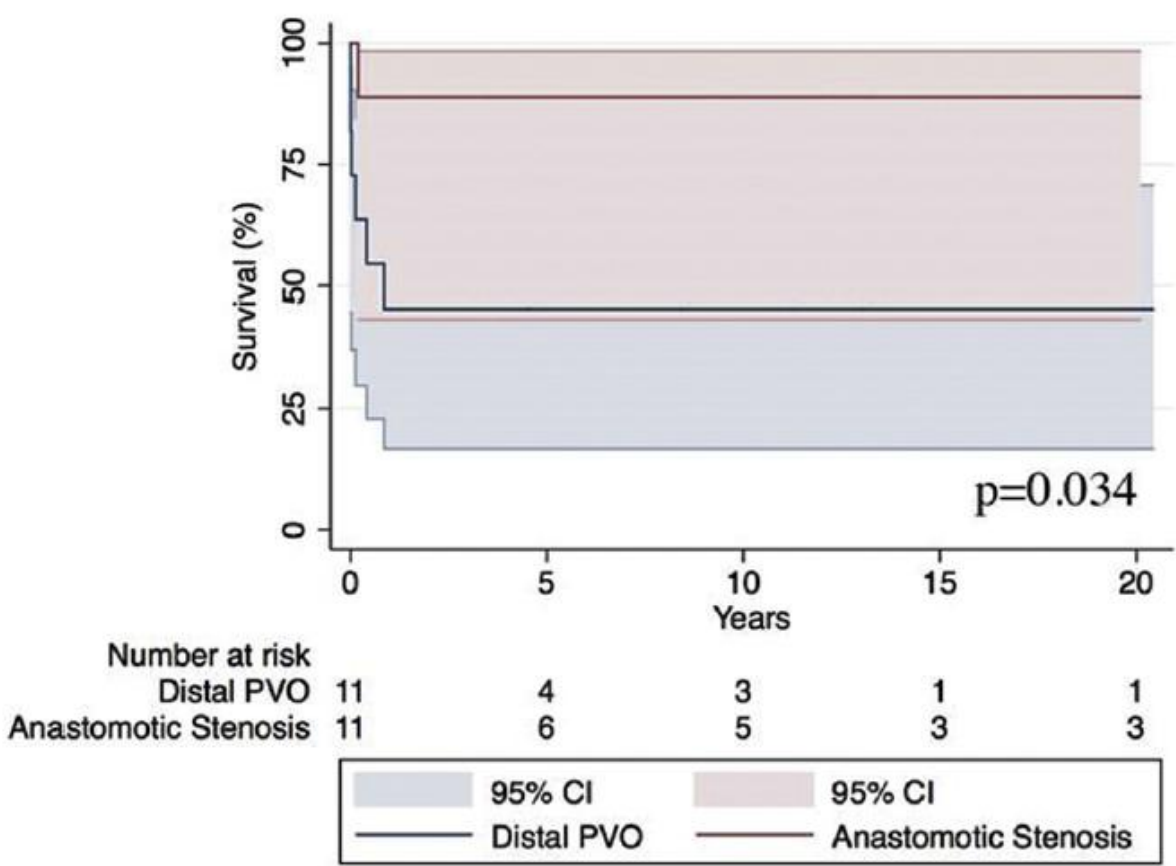
What is the rate of post-op pulmonary vein obstruction? Melbourne, Australia



Reoperation for post-op pulmonary vein obstruction **10%**

Most occurred within **1 yr** of the surgery.

Survival following reoperation very different in anastomotic obstruction patients vs intrinsic pulmonary vein stenosis.



What is the rate of post-op pulmonary vein obstruction?

UK, Ireland, Sweden



19 Paediatric Cardiac Surgery Units – UK, Ireland, Sweden

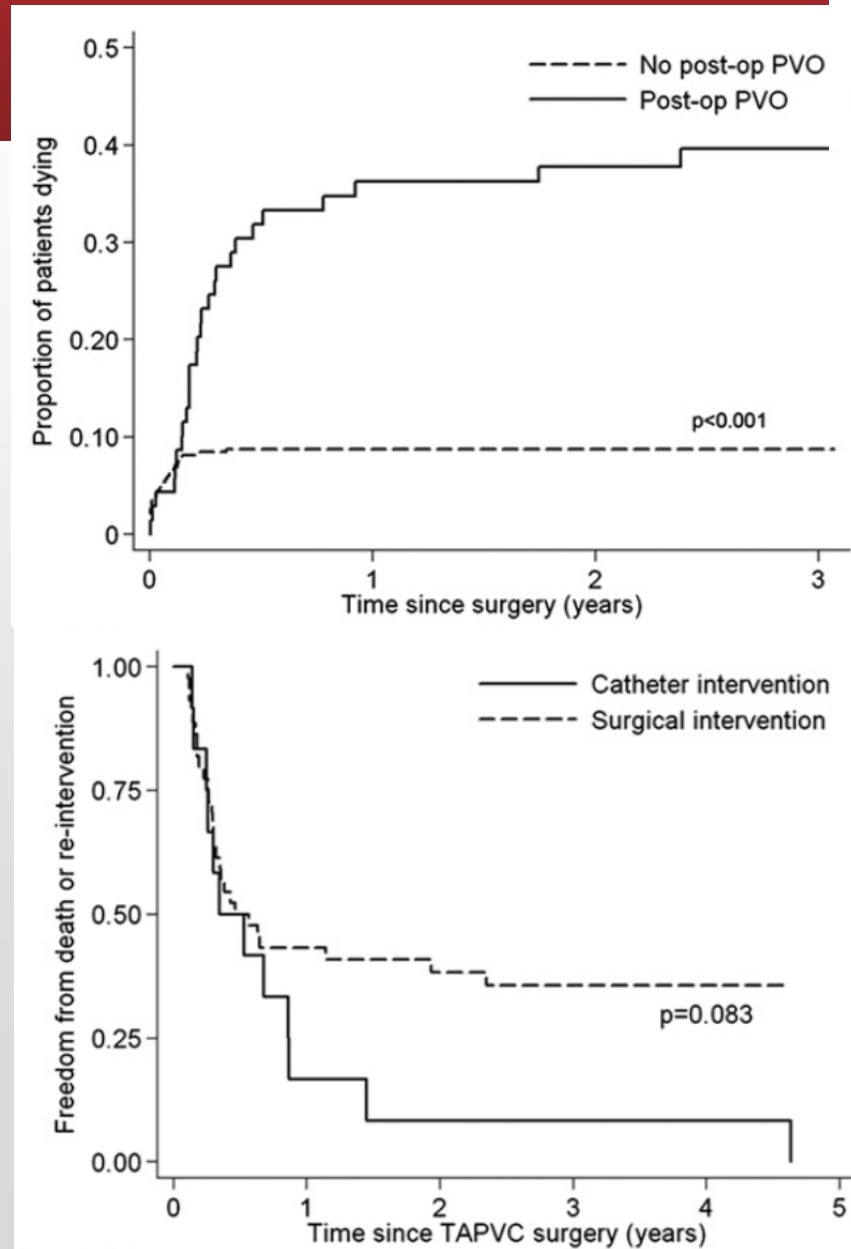
1998-2004

406 patients with TAPVD repair

17.5% had post-op pulmonary vein obstruction

83% occurred within 6 months of surgery.

3 yr survival for those with post-op obstruction was 59%



What is the rate of post-op pulmonary vein obstruction? Shanghai series of Supracardiac TAPVD repair



Series of patients with superior approach to supracardiac TAPVD only

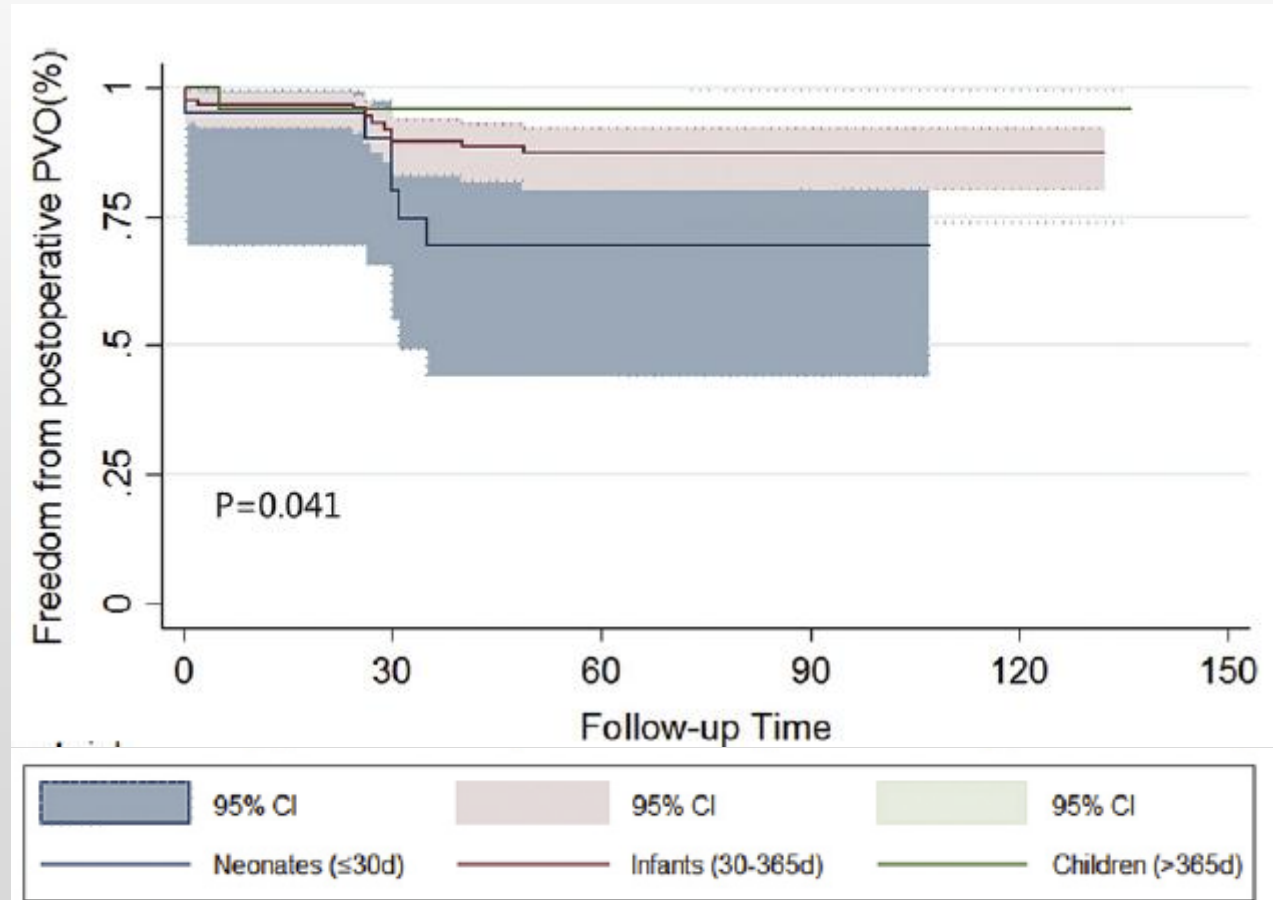
2004-2016

198 patients

Median age 95 days and median weight 5 Kg.

Early mortality 3%

12.5% required reoperation for obstruction.



Are there patients that we should consider not offering surgery?

- Critically unwell at presentation – cardiac arrest
- Common pulmonary vein atresia or severe hypoplasia
- Neonates with Univentricular Circulation

Outcomes of total anomalous pulmonary venous connection in neonates with univentricular circulation

Matthew S. Yong^{a,b,c}, Michael Z. Li

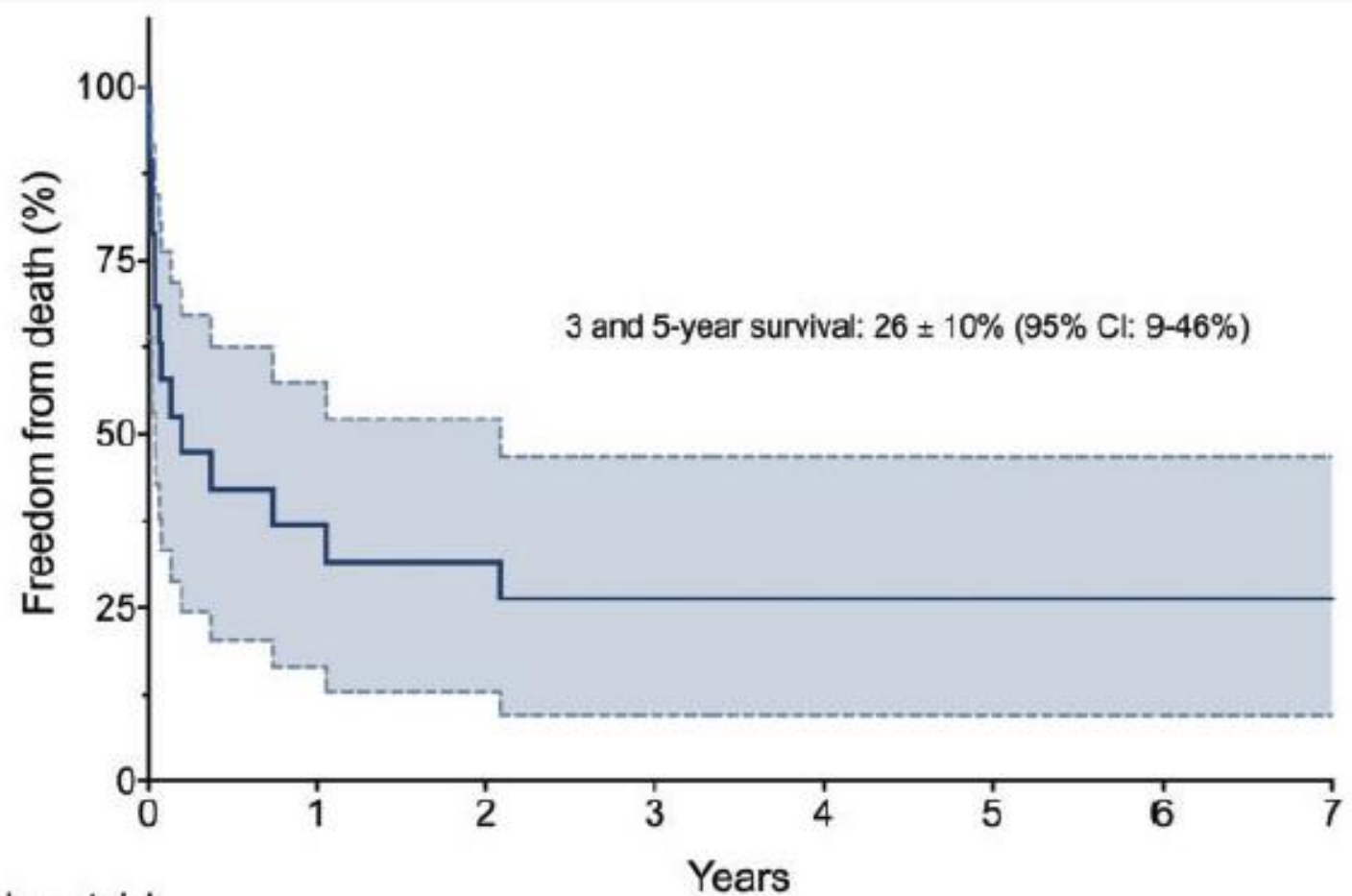
19 neonates over 30 yrs in Melbourne

RV dominance had 54% early mortality

LV dominance or unbalanced had 17% mortality

26% of survivors underwent reoperation for pulmonary stenosis

Longterm survivors = 2 completed Fontan(10%), 3



Summary

- Whatever surgical technique – wide anastomosis, no distortion, use an absorbable suture, avoid cutting into the pulmonary veins themselves.
- Early post-op Mortality Rate 5-15%
- Post-op pulmonary vein obstruction occurs in 10-20%
- Post-op pulmonary vein obstruction most likely to occur in the first 6 months post-op.
- Poor outcomes for neonates with TAPVD and single ventricle longterm