Heart Rhythm Congress

October 2016

Arrhythmias

in repaired CHD

frequency and options…

Dr Graham Stuart

Bristol Congenital Heart Unit

Early post operative arrhythmias

Predict

Late arrhythmias

Vent dysfunction

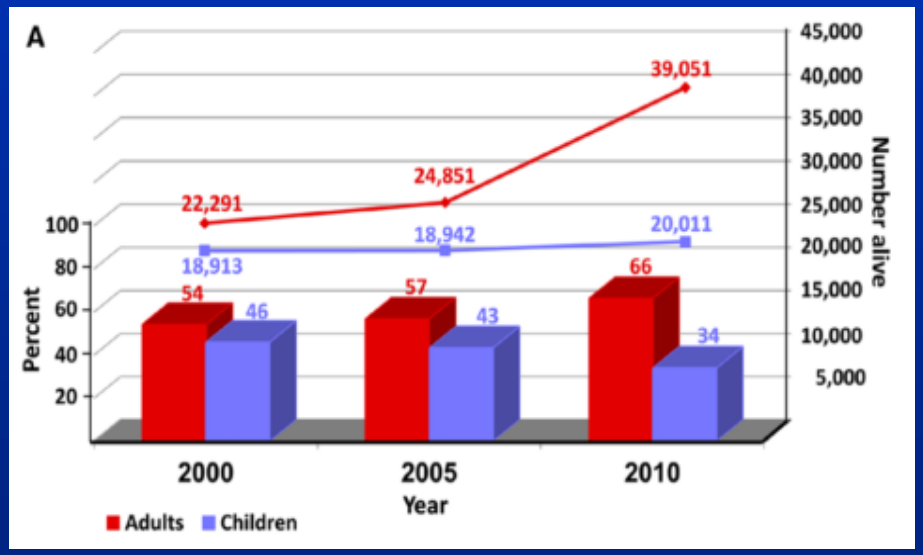
Late mortality

- 14-18% early postoperative arrhythmias Batra 2006 Delaney 2006
- Predictor for late complications eg post Fontan/ Mustard

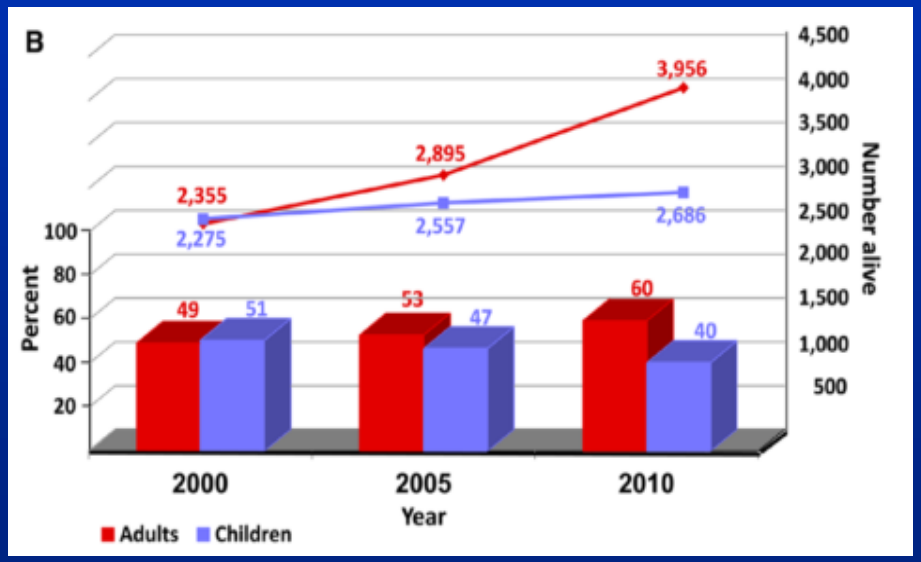
Lifetime Prevalence of Congenital Heart Disease in the General Population From 2000 to 2010

Marelli AJ et al Circulation 2014;130:769-756

All CHD



Complex CHD



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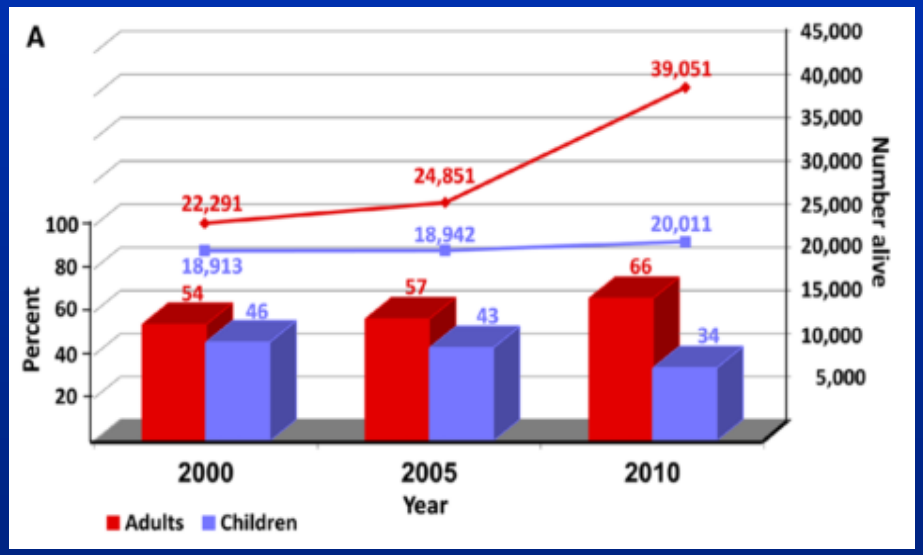

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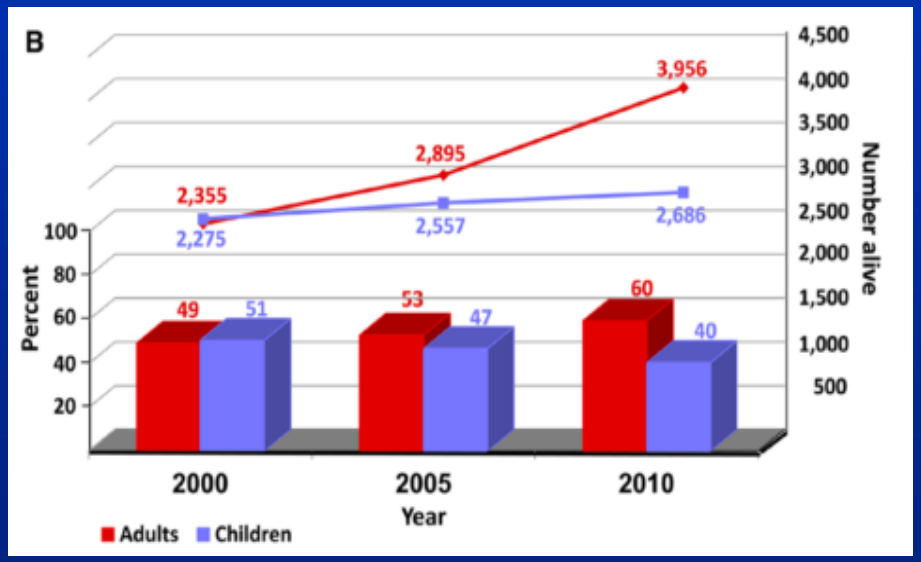

- 50% increased prevalence of adults with CHD since 2000
- Adults > 2/3 patients with both simple & complex CHD

Arrhythmias
in repaired CHD

- What is the incidence ?
- Why are arrhythmias common?
- Medical treatment
- Interventional treatment
- Surgical options

Arrhythmias

in repaired CHD

- What is the incidence in adults?
- Why are arrhythmias common?
- Interventional treatment
- Surgical options

Early post operative arrhythmias

Late post operative arrhythmias

Postoperative arrhythmias in adults with congenital heart disease: Incidence and risk factors ☆

Z. Koyak [a,1], R.C.A. Achterbergh [b,1], J.R. de Groot [a], F. Berger [c], D.R. Koolbergen [a,b], B.J. Bouma [a], W.K. Lagrand [d], M.G. Hazekamp [b], N.A. Blom [b], B.J.M. Mulder [a,*]

International Journal of Cardiology 169 (2013) 139–144

- Multicentre retrospective
  Berlin / Amsterdam
- Jan 2009 – Dec 2011
- 419 patients
  - 38 +/- 14 yrs 55% male

Excluded

- Transplantation
- Age < 18yrs

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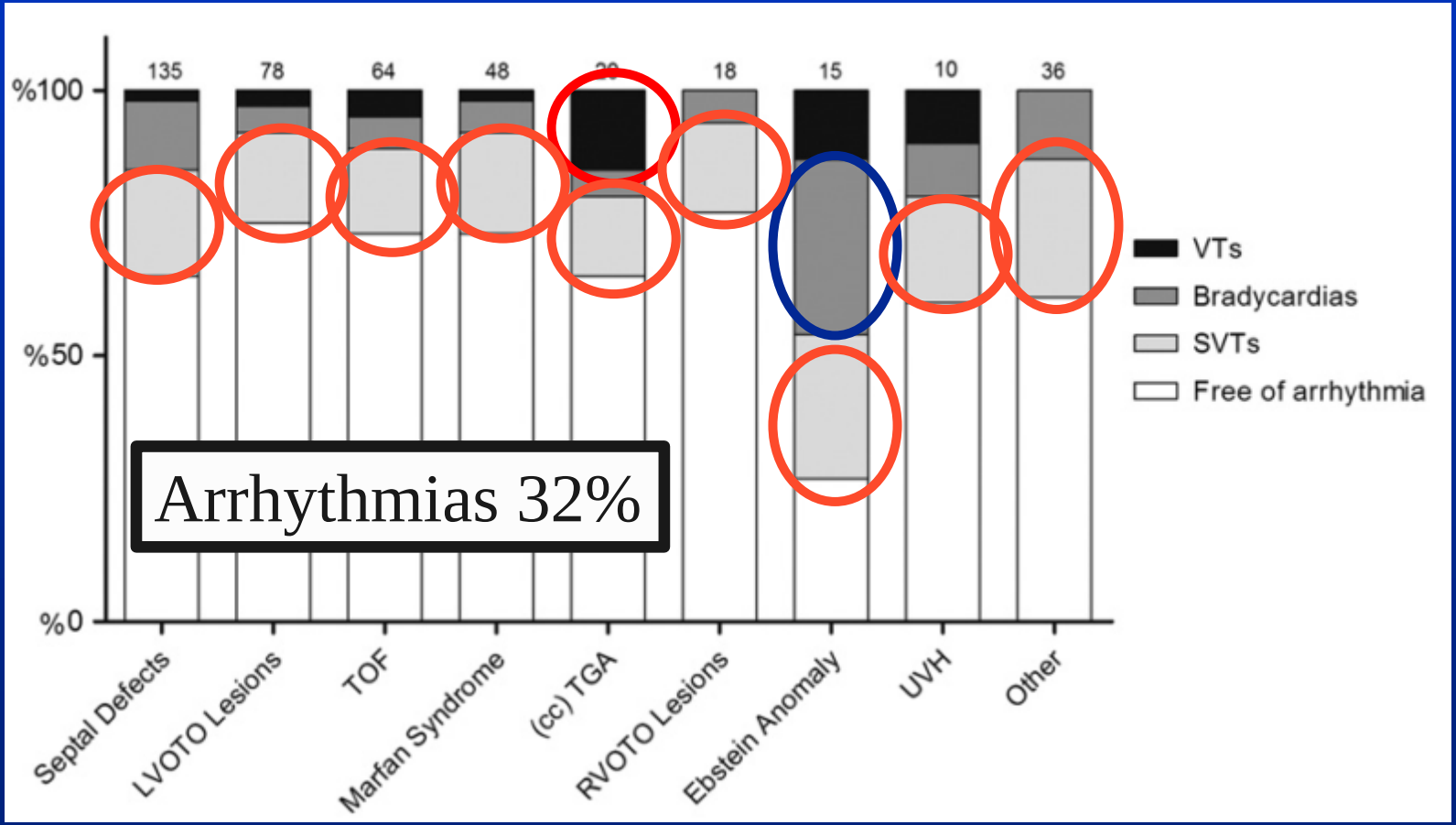

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Main Risk factors

- Age > 40yrs at surgery OR 2.5 1.4-4.6
- NYHA class>II OR 2.4 1.2-4.7
- subPulm AVVR OR 2.8 1.2-6.7
- Byass time OR 1.3 per 60 min increase

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International Journal of Cardiology 169 (2013) 139–144

Serious Clinical Events in 13%

- Pacemaker implantation 5%
- Heart Failure 4%
- Death 2%
- In hospital arrhythmias associated with clinical events OR 7.8 2.4-25.5

Postoperative arrhythmias in adults with congenital heart disease: Incidence and risk factors ☆

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International Journal of Cardiology 169 (2013) 139–144

- Post operative arrhythmias relatively common
- Older, symptomatic patients with significant valve disease

ESC Guidelines for the management of grown-up congenital heart disease (new version 2010)

Eur Heart J 2010;31:2195-2957

EUROPEAN SOCIETY OF CARDIOLOGY®

"Arrhythmias are the main reason for hospitalisation of ACHD patients and they are an increasingly frequent cause of morbidity and mortality."

The Somerville Foundation

Help & Advice

Welcome to our Help & Advice pages where you will find lots of information for those Born with a Heart Condition.

Living with and Managing Your Heart Condition can bring up lots of questions around your Physical Health, and Emotional and Mental Health, which we hope we can help to address and answer.

www.thesf.org.uk

Arrhythmias

most common

medical problem

referred to Helpline !

PACES/HRS Expert Consensus Statement on the Recognition and Management of Arrhythmias in Adult Congenital Heart Disease

Heart Rhythm 2014;11:e102-165

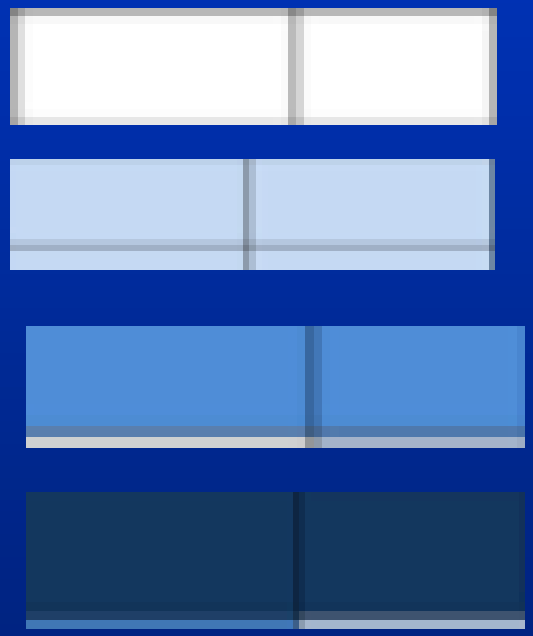
Approximate Risk Estimates for arrhythmia in ACHD

Minimal

Mild

Moderate

High



PACES/HRS Expert Consensus Statement on the Recognition and Management of Arrhythmias in Adult Congenital Heart Disease

Heart Rhythm 2014;11:e102-165

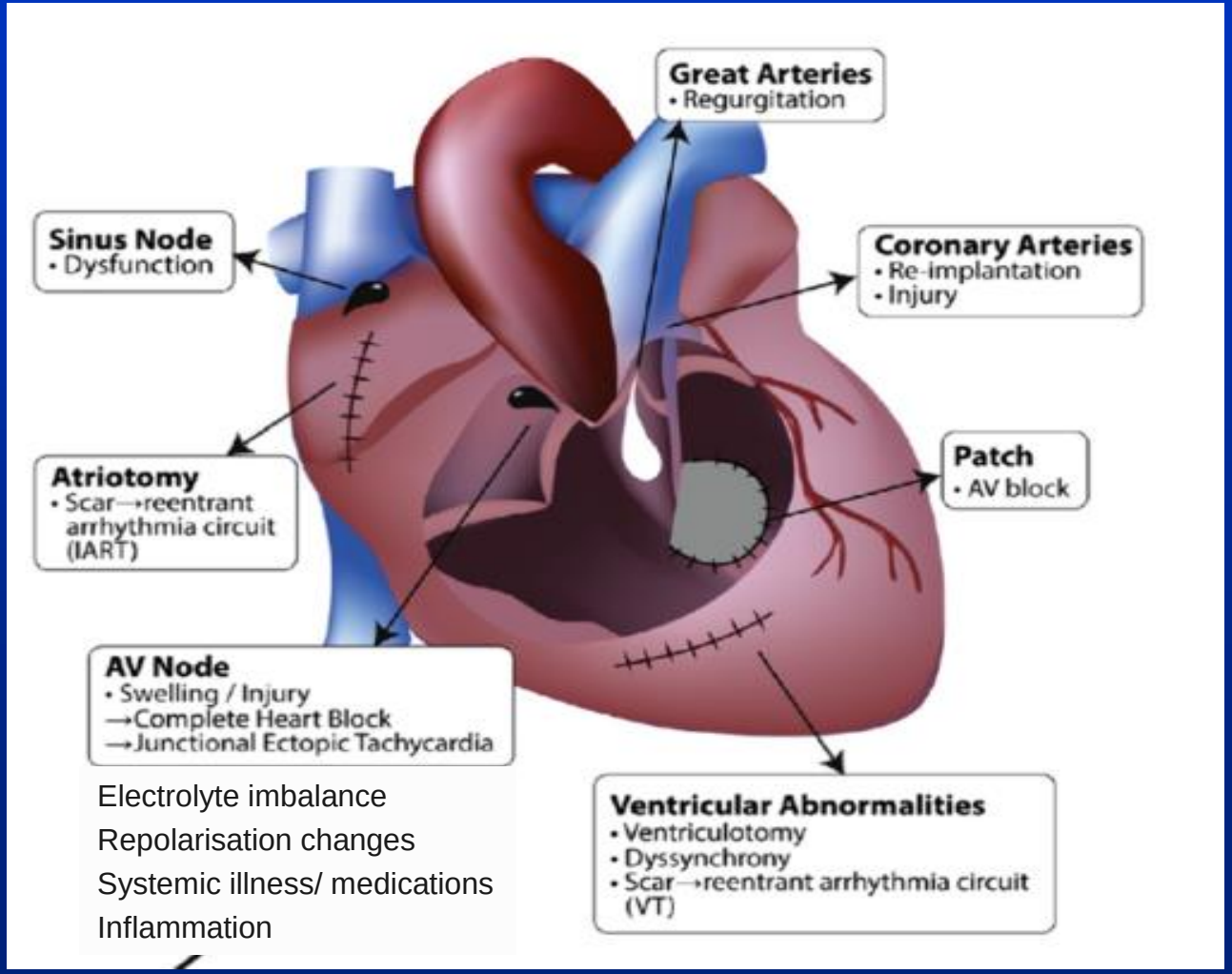
Complexity of CHD	Type of CHD	Prevalence (in CHD population)	Atrial Arrhythmia			Ventricular Arrhythmia	Other Pacing Needs		
			AT	AF	Other		SND	AV block	Dyssynchrony, heart failure
Simple	Patent ductus arteriosus	6-8%							
	Pulmonary stenosis	6-8%							
	Ventricular septal defect	30-32%							
	Secundum atrial septal defect	8-10%							
Moderate	Aortic coarctation	5-7%							
	Anomalous pulmonary venous return	0.5-2.5%							
	Atrioventricular septal defect	3-5%							
	Aortic stenosis	3-5%							
	Ebstein anomaly	0.5-1.5%							
	Tetralogy of Fallot	8-10%							
	Primum atrial septal defect	2-3%							
Severe	Truncus arteriosus	1.5-2%							
	Pulmonary atresia	2-2.5%							
	Double outlet right ventricle	1.5-2%							
	D-transposition of the great arteries	6-7%							
	L-transposition of the great arteries	1-2%							
	Hypoplastic left heart syndrome	3-4%							
	Other (heterotaxy, other single ventricles)	7-10%							

Arrhythmias
in repaired CHD

- What is the incidence ?
- Why are arrhythmias common?
- Medical treatment
- Interventional treatment
- Surgical options

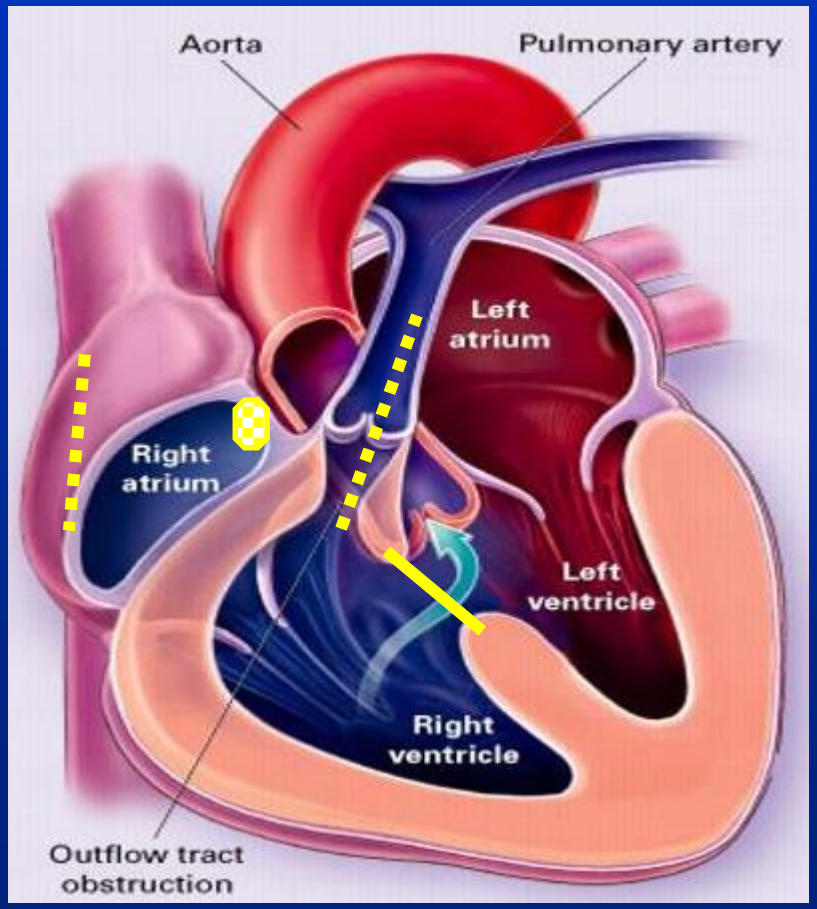
Why are arrhythmias common?

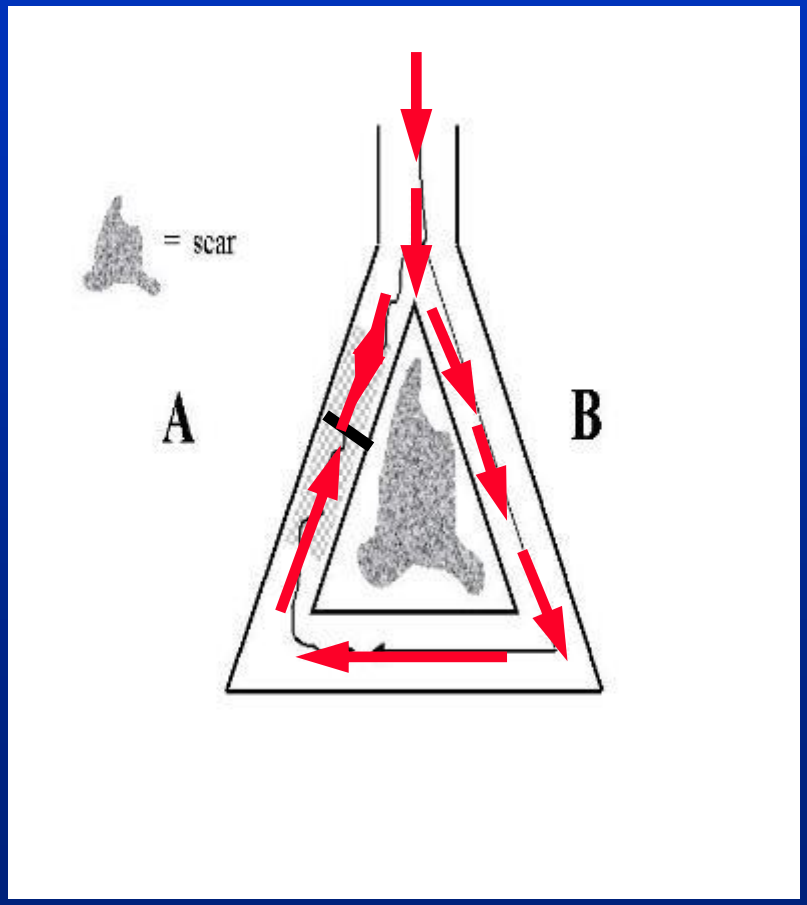
Escudero et al Can J Cardiol 2013;29(7):821-9



Electrolyte imbalance
Repolarisation changes
Systemic illness/ medications
Inflammation

Scar related arrhythmias





Surgical scars

Arrhythmias
in repaired CHD

- What is the incidence ?
- Why are arrhythmias common?
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- Surgical options

Efficacy of Antiarrhythmic Drugs in Adults With Congenital Heart Disease and Supraventricular Tachycardias

Koyak Z et al Am J Cardiol 2013;112:1461-1467

- Multicentre study/ retrospective
- Efficacy of AAD in SVT
- 2008-2011 CONCOR Database
- All new onset SVT in ACHD
  - excluded non cardiac causes of arrhythmia eg hypoT4

Efficacy of Antiarrhythmic Drugs in Adults With Congenital Heart Disease and Supraventricular Tachycardias

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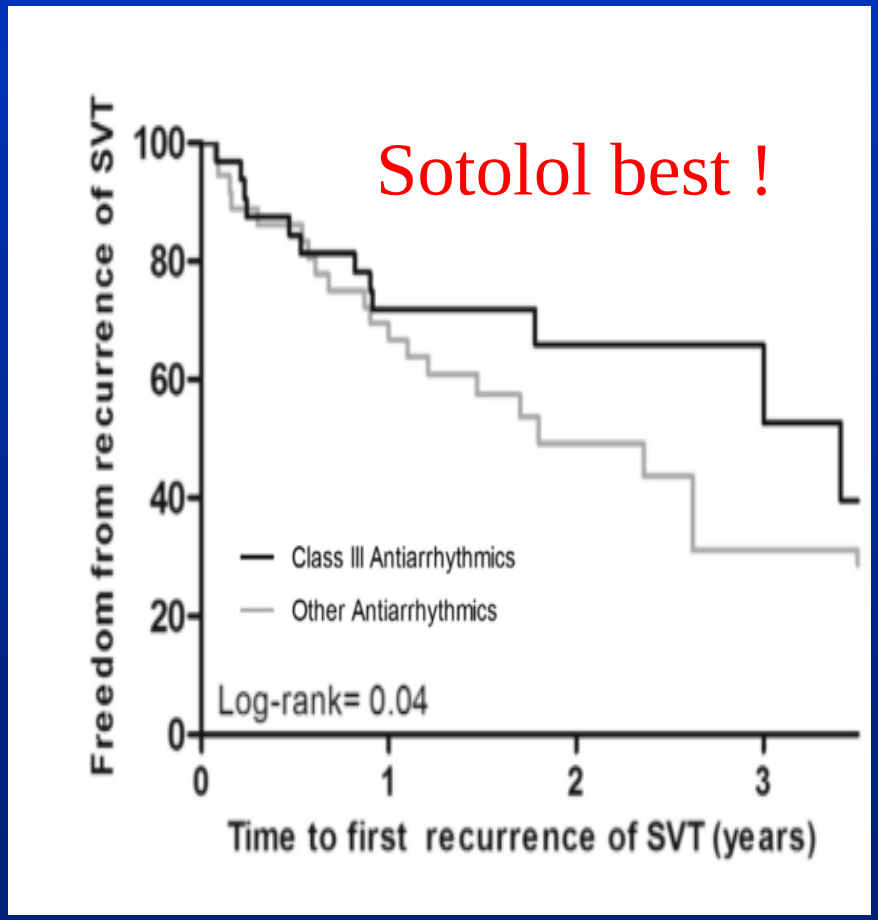

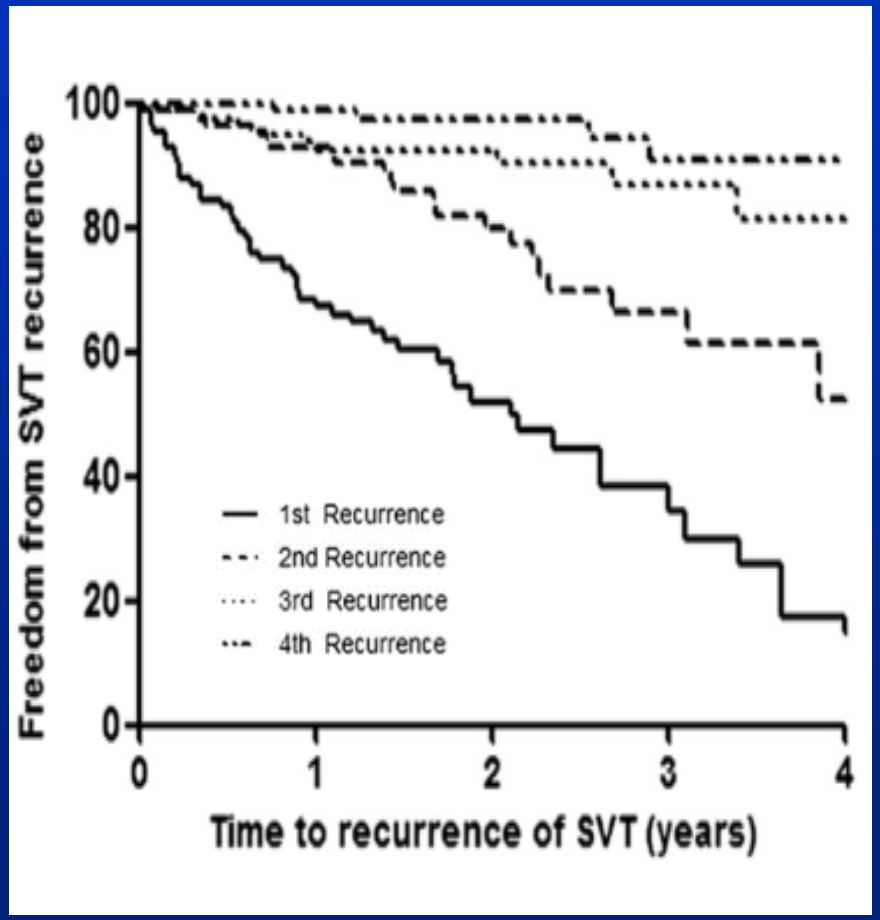

Efficacy of Antiarrhythmic Drugs in Adults With Congenital Heart Disease and Supraventricular Tachycardias

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Conclusion

Class III most effective for SR

Sotolol should be Ist choice for SVT

What is the optimal drug Rx of ventricular arrhythmias in ACHD?

What is the optimal drug Rx of ventricular arrhythmias in ACHD?

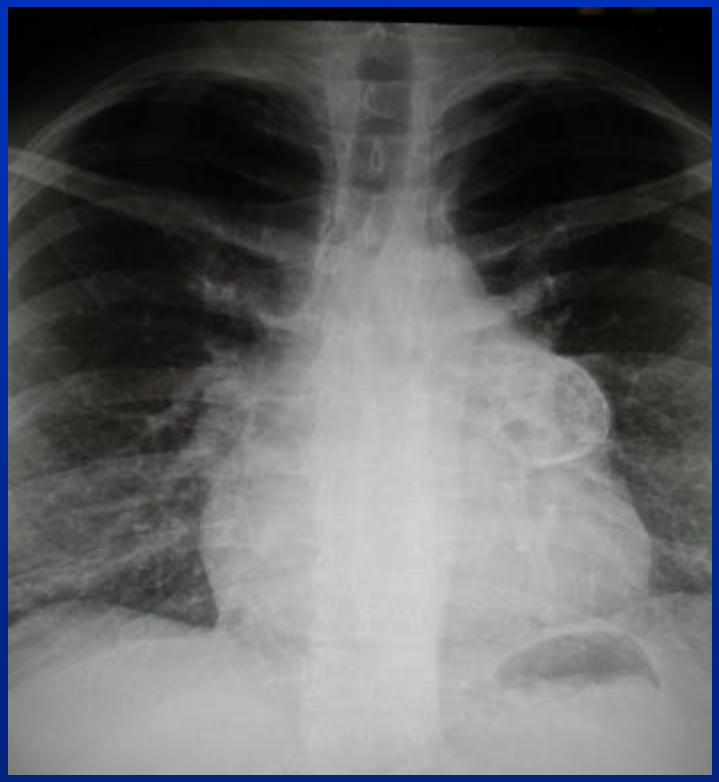
Answer

We havent got a Scooby....

Cockney rhyming slang

Scooby's = Scooby Doo = clue Wikipedia

Ventricular Arrhythmias in CHD

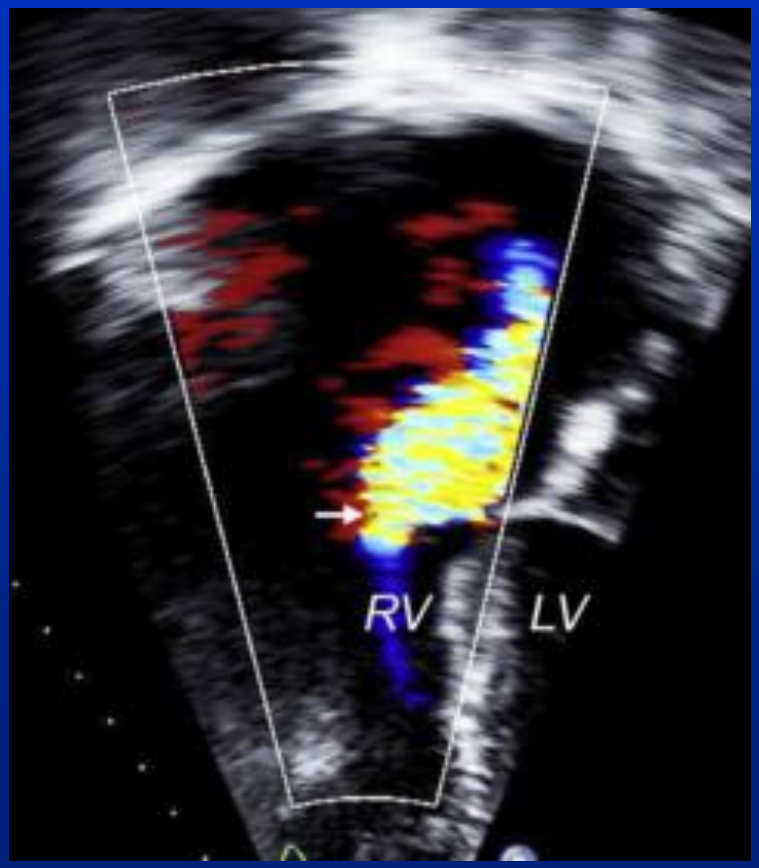


Treat haemodynamic Problem……

34yr old TOF - lost to follow up

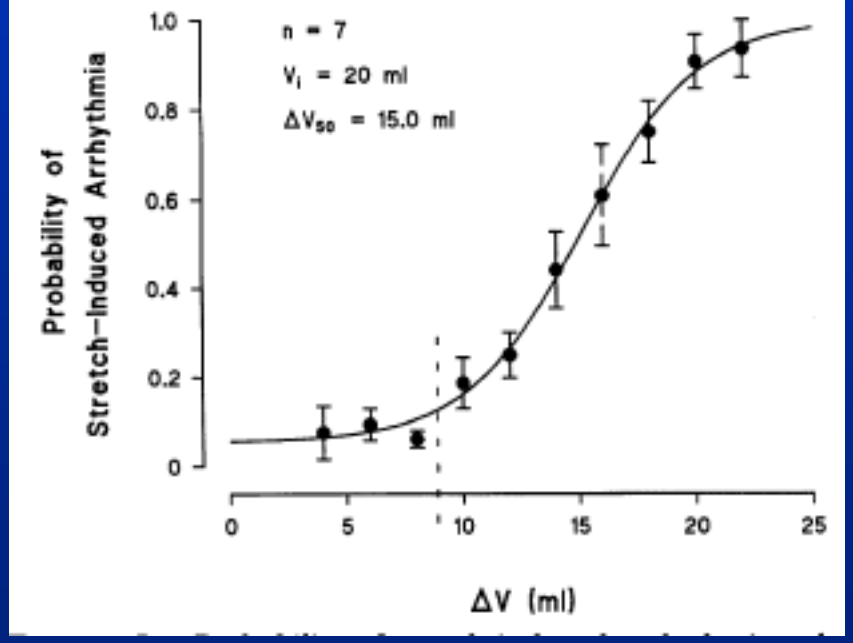
Tetralogy of Fallot

risk factors for arrhythmias



Severe TR in TOF

Hansen et al Circulation 1990;81:1094-1105



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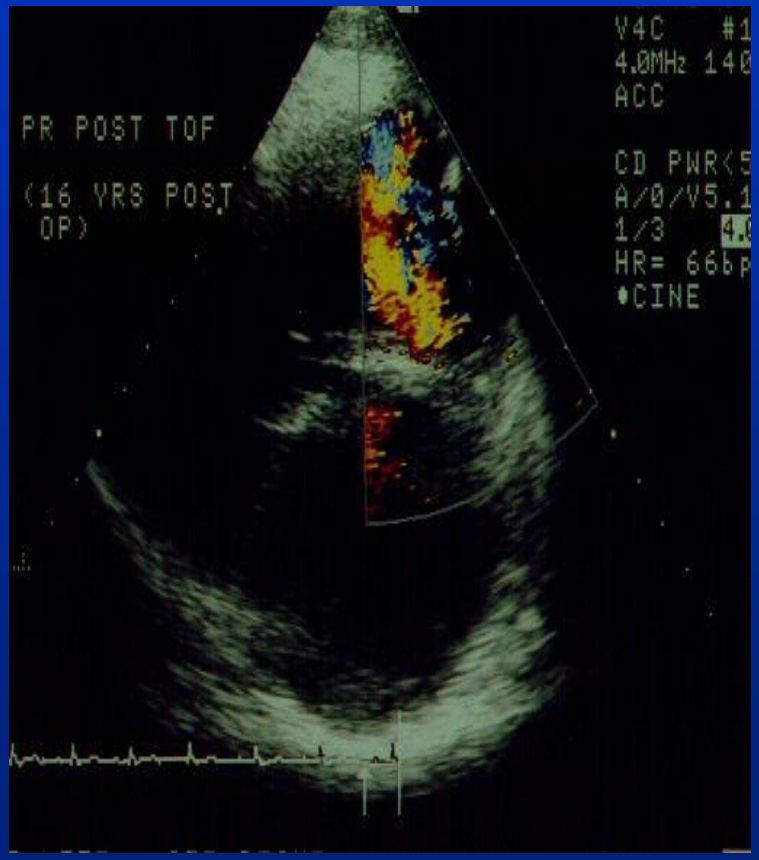
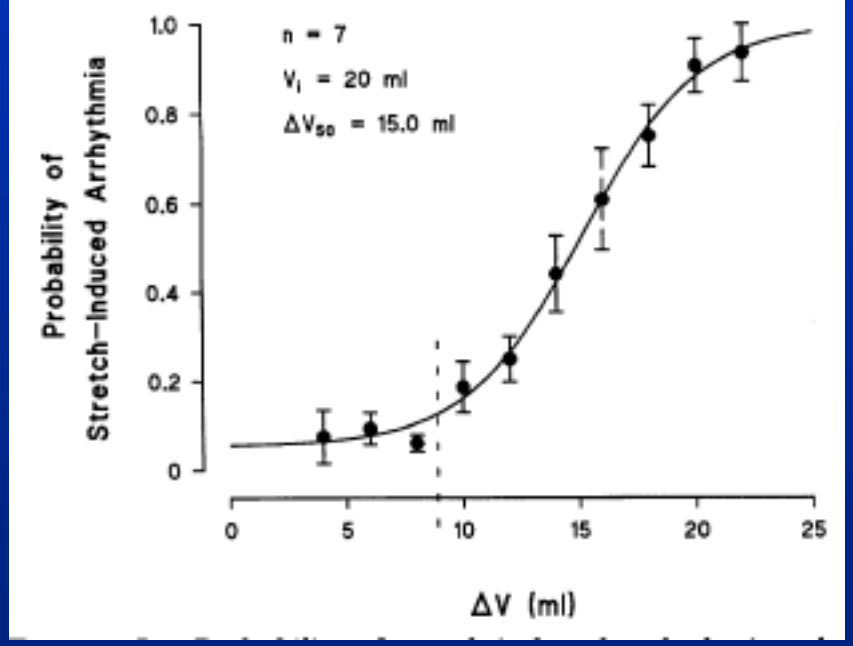
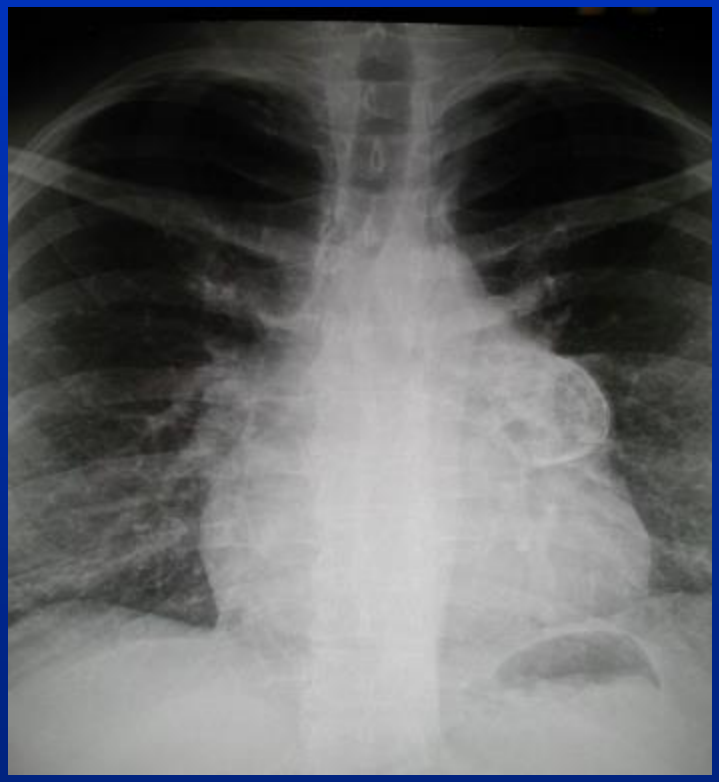


Severe PR in TOF

Hansen et al Circulation 1990;81:1094-1105



Ventricular Arrhythmias in CHD



34yr old TOF - lost to follow up

Treat haemodynamic Problem……

AA Drugs have limited role

Consider ICD +/- bivent

Arrhythmias
in repaired CHD

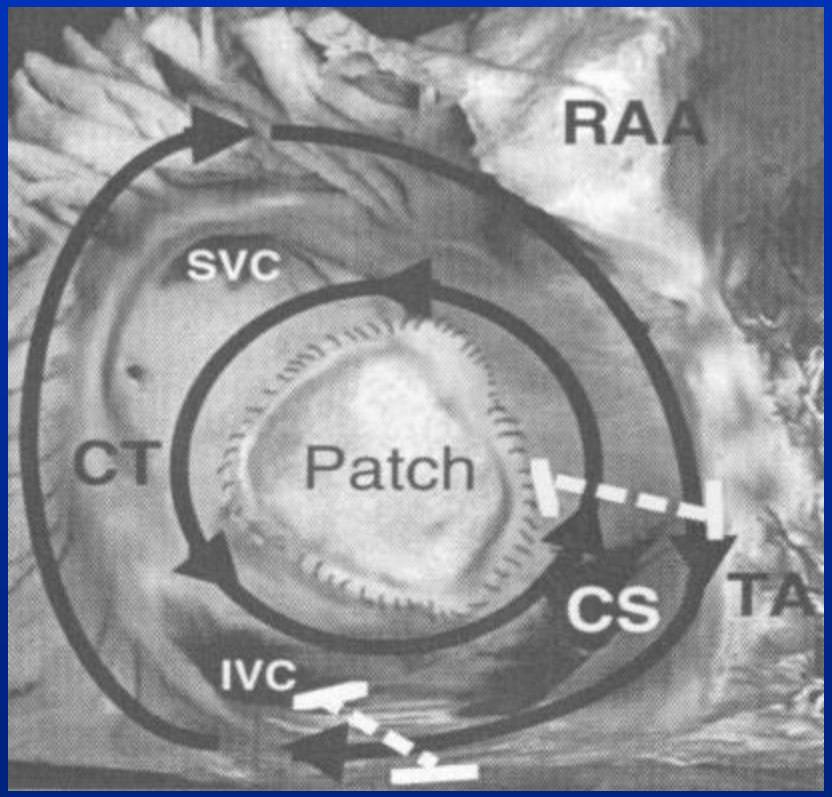
- What is the incidence ?
- Why are arrhythmias common?
- Medical treatment
- Interventional treatment
- Surgical options

Tetralogy of Fallot

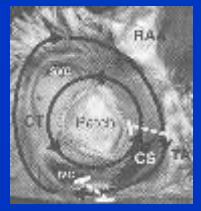
arrhythmias: atrial scar

Scar-related tachycardia

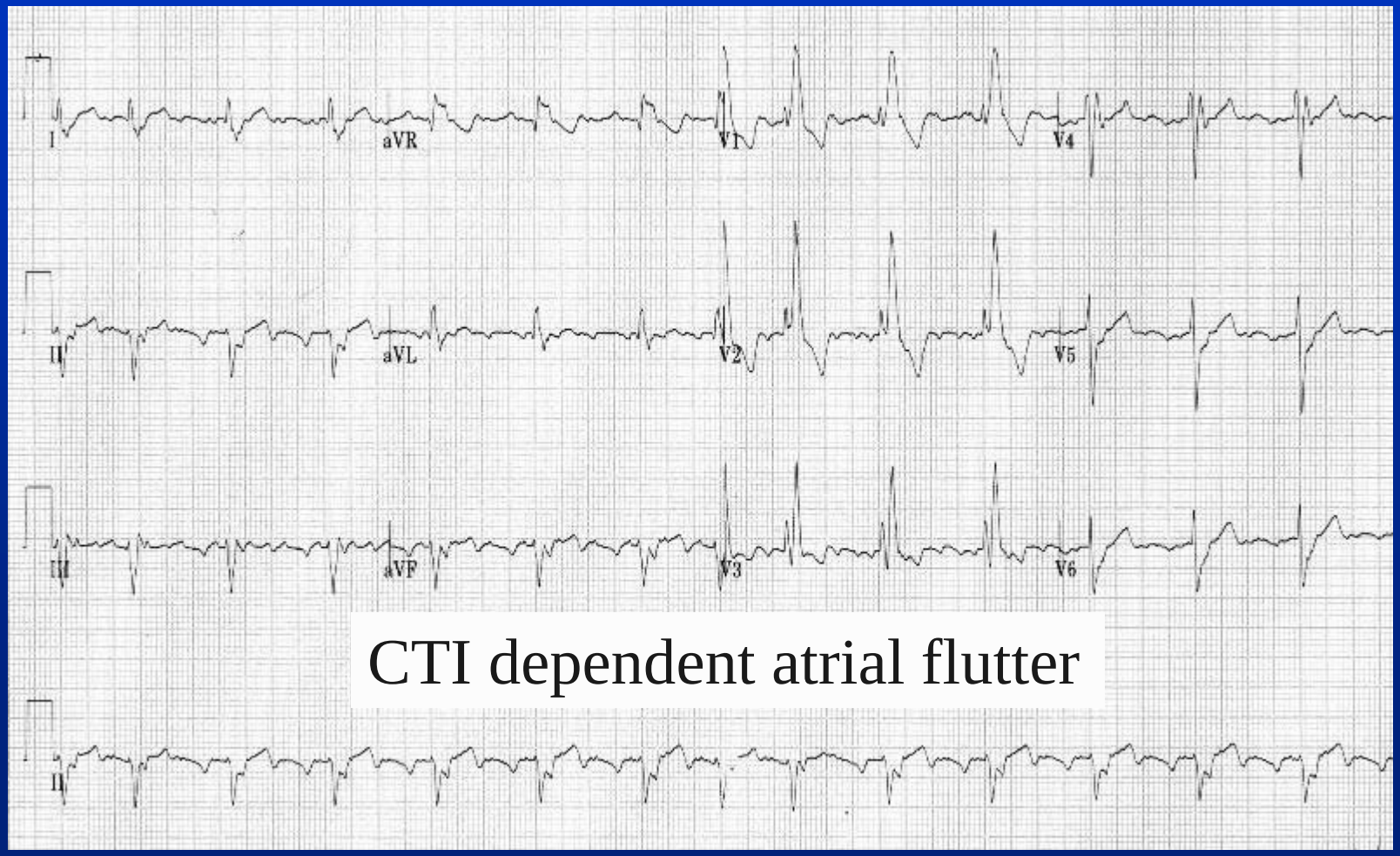
IART



Tetralogy of Fallot



atrial arrhythmias: scar



CTI dependent atrial flutter

Importance of Tachycardia Cycle Length for Differentiating Typical Atrial Flutter from Scar-Related in Adult Congenital Heart Disease

Uhm et al PACE 2012;35:1338-47

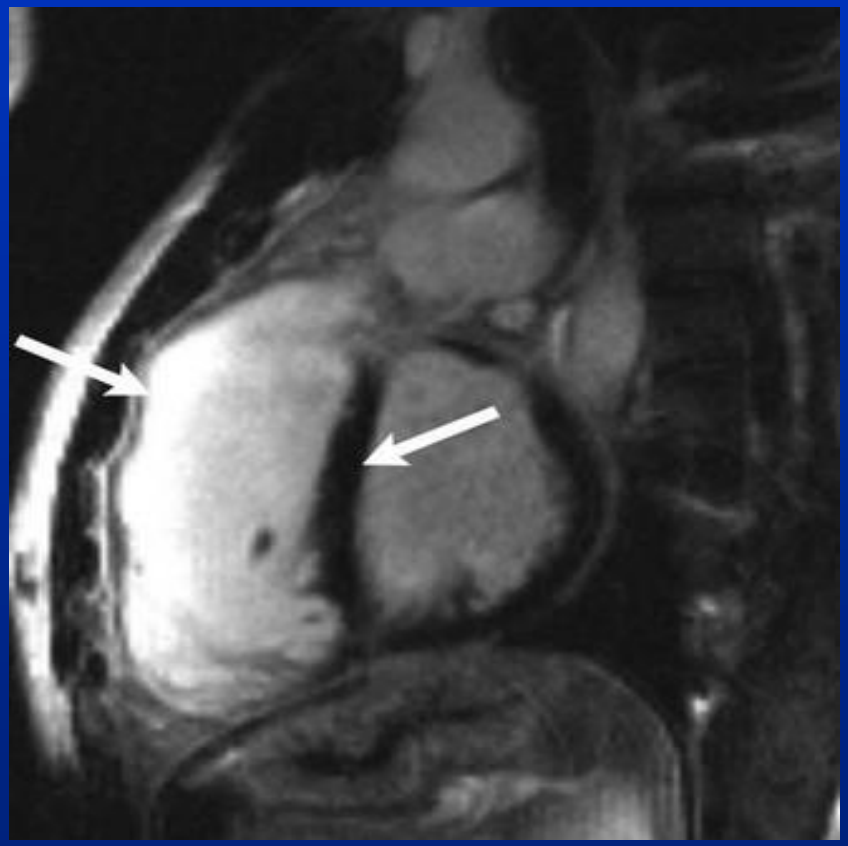
- 34 ACHD patients with IART TOF 11
- 38 tachycardias
  - 58% CTI dependent 34% scar related
- Not predictable on ECG morphology
  - Saw tooth inferior leads +F wave V1 only 57%

CTI dependent IART slower than non CTI

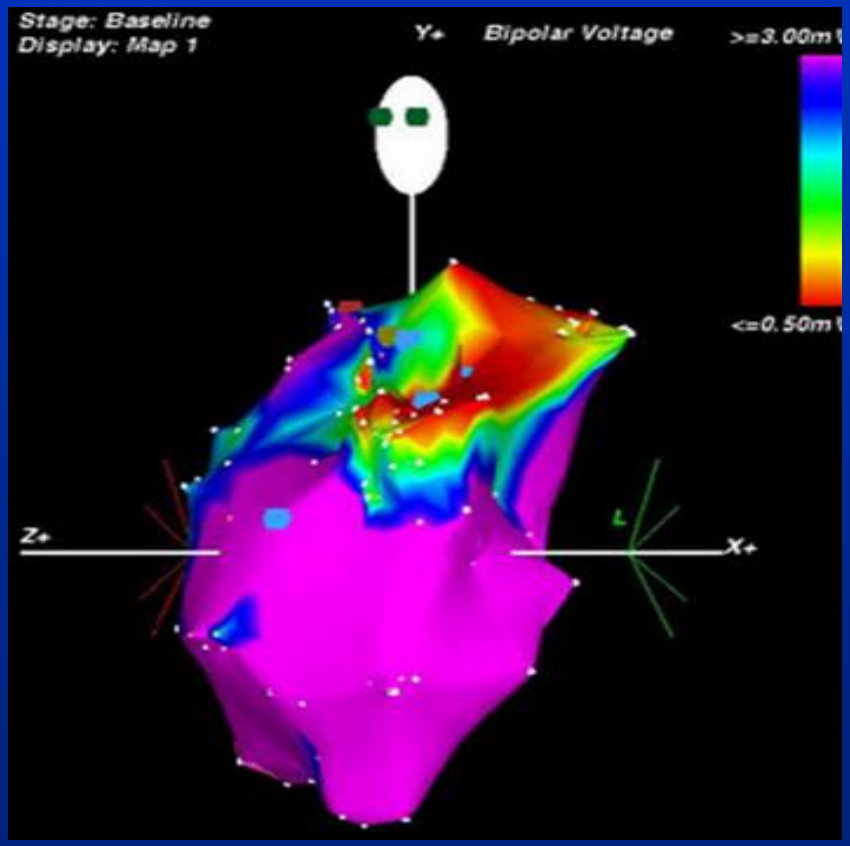
- CL>250ms = 79% sensitivity for CTI

Tetralogy of Fallot

arrhythmias: scar



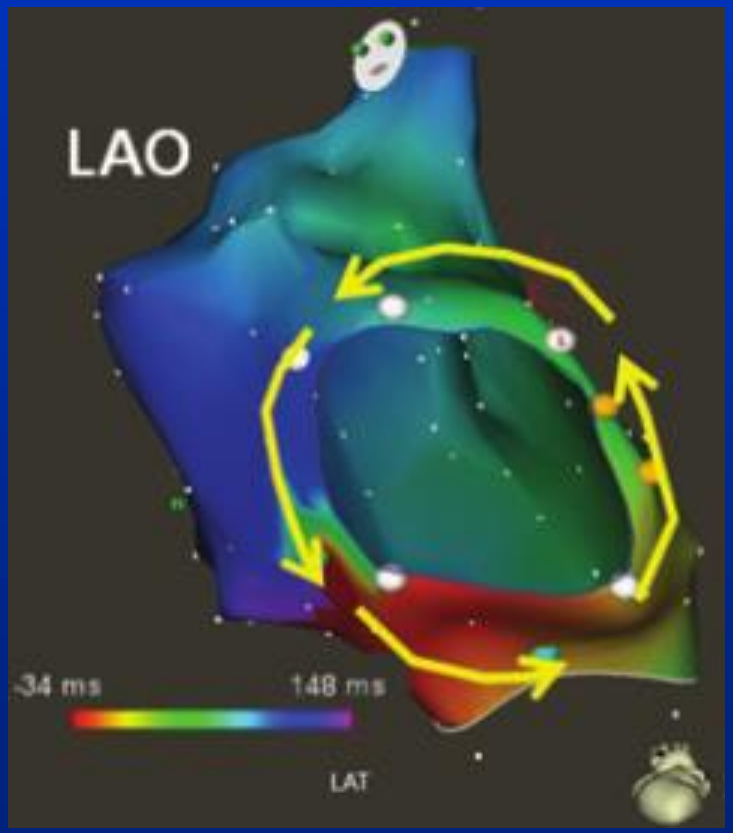
MRI : late gad + RVOT

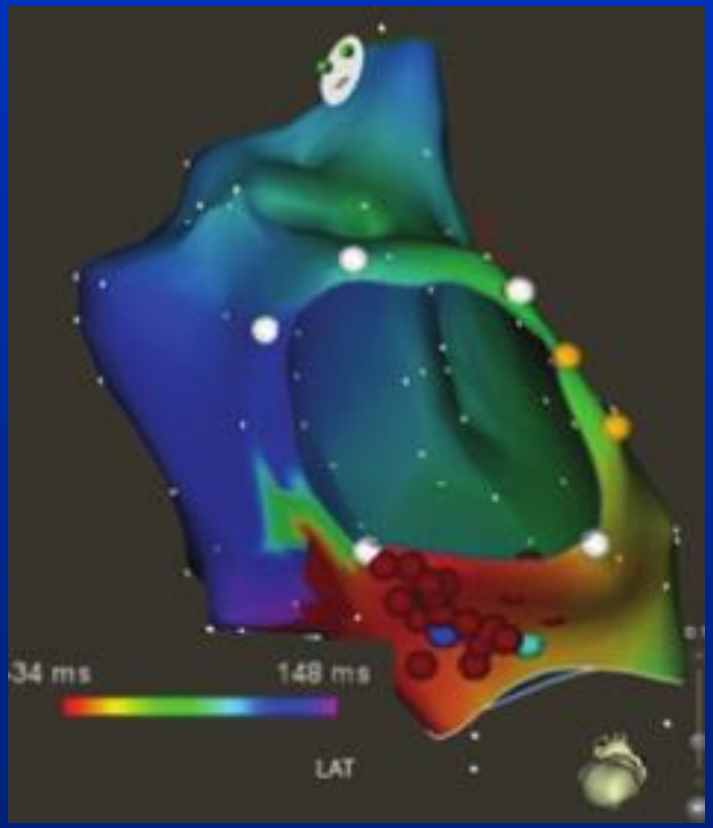


CARTO: RVOT reentry

Tetralogy of Fallot

atrial arrhythmias: CTI dependent





Use all the Toys !

3D mapping

Smarttouch

Irrigated tip

Confidence

Software….

Arrhythmias
in repaired CHD

- What is the incidence ?
- Why are arrhythmias common?
- Medical treatment
- Interventional treatment
- Surgical options

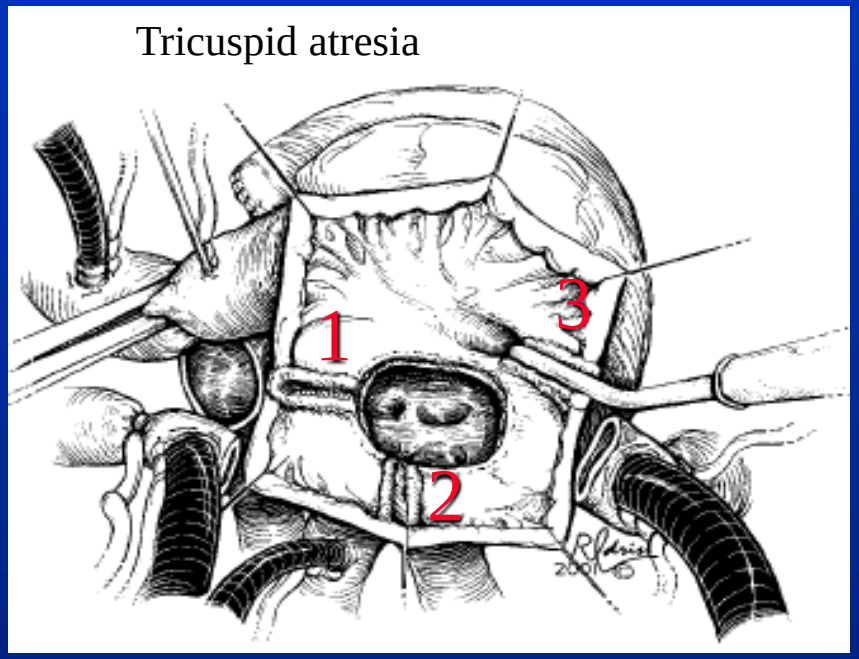
Learning point !

Surgeons need to think electrically ……

Initial surgery
complete lines of block

Redo surgery
Cox maze if known arrhythmia

Modified Right sided Maze



IVC/ SVC transected

Atrial wall excised

ASD patch removed

Cryoablation lesions

-60 degrees for 90 secs

1. Superior Atrial septal ridge to RA appendage incised area
2. Posterior Atrial septal ridge to RA appendage incised area
3. Isthmus ablation (varies with anatomy)

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Heart Rhythm Congress

October 2016

Arrhythmias

in repaired CHD

frequency and options…

Dr Graham Stuart

Bristol Congenital Heart Unit

PACES/HRS Expert Consensus Statement on the Recognition and Management of Arrhythmias in Adult Congenital Heart Disease

Heart Rhythm 2014:11(10):102-164

1. Care for ACHD arrhythmias – "coordinated by ACHD centres of excellence"

Include
- Electrophysiologist
- Interventional cardiologist
- Cardiac surgeon

} expertise in CHD

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Heart Rhythm 2014:11(10):102-164

1. Care for ACHD arrhythmias – "coordinated by ACHD centres of excellence"

2. If symptomatic ACHD arrhythmias –

History
12 lead ECG
Ambulatory ECG

"Loop recorders"
if symptoms sporadic

PACES/HRS Expert Consensus Statement on the Recognition and Management of Arrhythmias in Adult Congenital Heart Disease

Heart Rhythm 2014:11(10):102-164

1. Care for ACHD arrhythmias – "coordinated by ACHD centres of excellence"

2. If symptomatic ACHD arrhythmias –

Indications for haemodynamic study…..

All new onset or worsening arrhythmias or near miss – SCD **+ coronaries…**

PACES/HRS Expert Consensus Statement on the Recognition and Management of Arrhythmias in Adult Congenital Heart Disease

Heart Rhythm 2014:11(10):102-164

1. Care for ACHD arrhythmias – "coordinated by ACHD centres of excellence"

2. If symptomatic ACHD arrhythmias –

Indications for EP study …..

All unexplained syncope +

High risk CHD substrate eg TGA/TOF/Single vent

PACES/HRS Expert Consensus Statement on the Recognition and Management of Arrhythmias in Adult Congenital Heart Disease

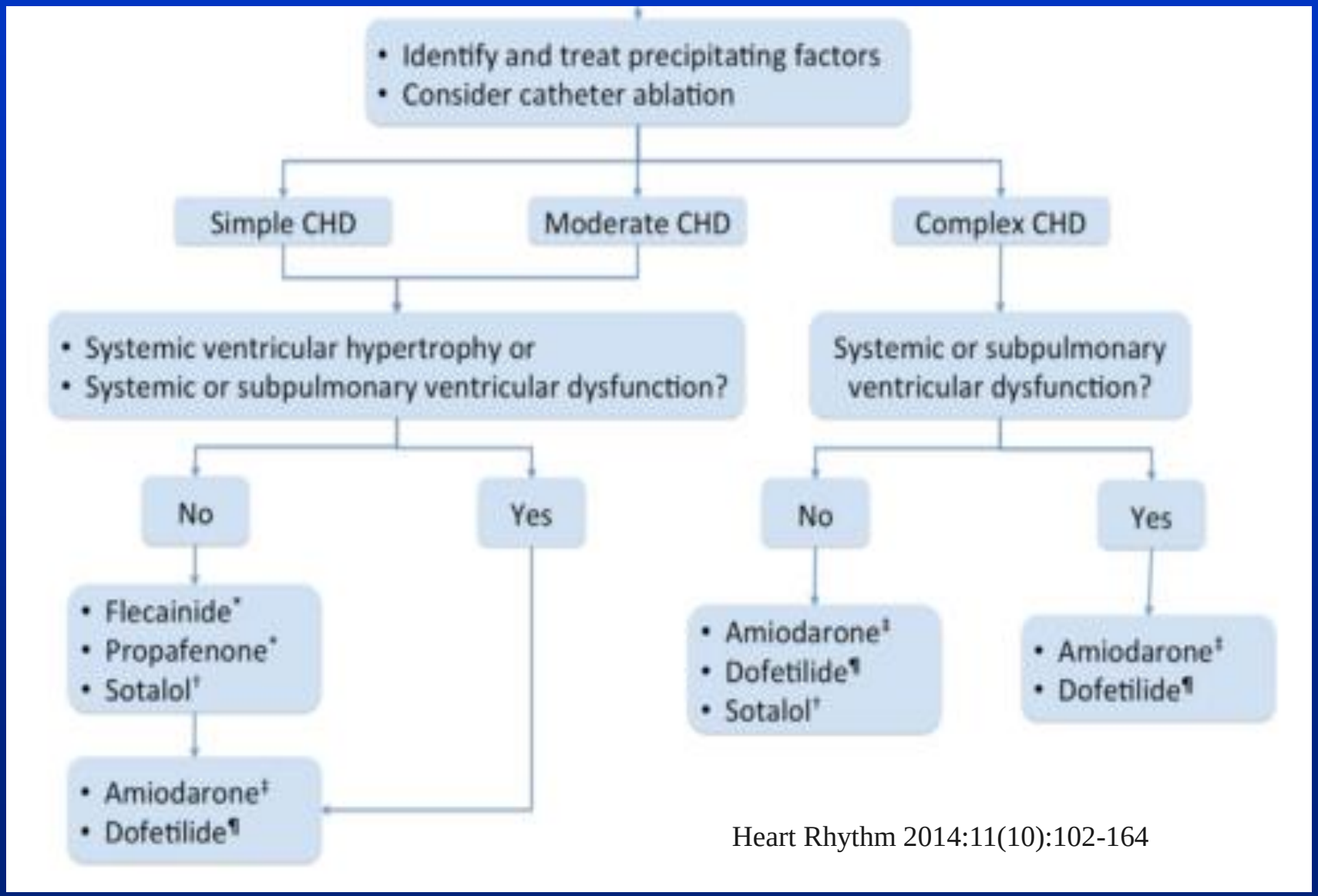
Heart Rhythm 2014:11(10):102-164

1. Care for ACHD arrhythmias – "coordinated by ACHD centres of excellence"

2. If symptomatic ACHD arrhythmias –

3. Algorithm for acute therapy

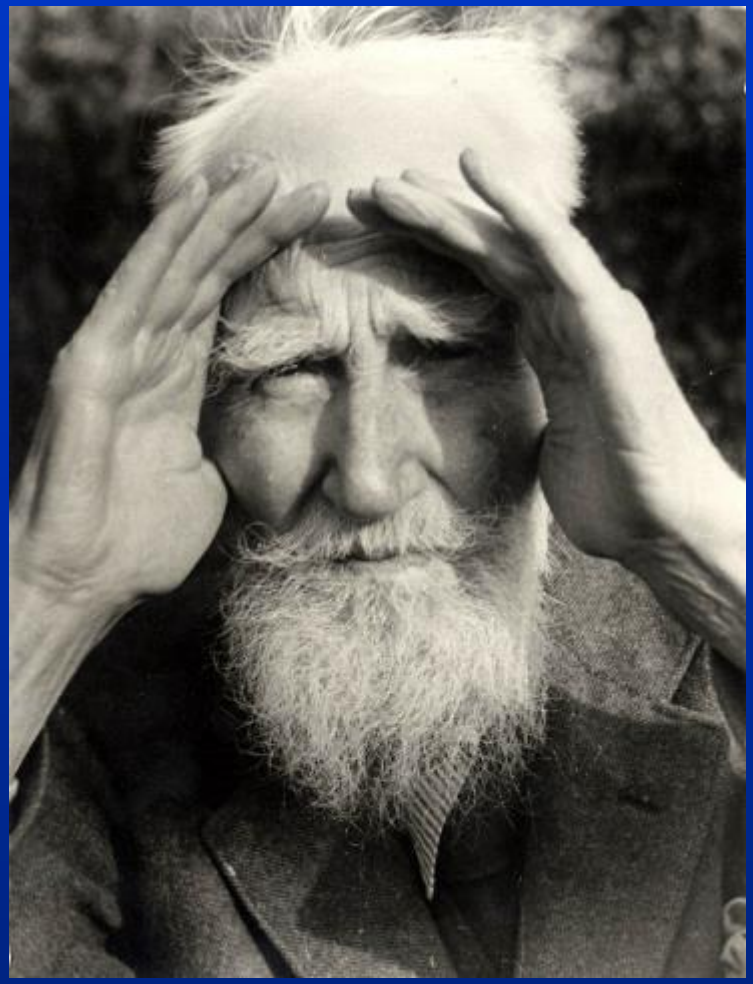
Rhythm Control in adults with CHD and IART or AFib



Heart Rhythm 2014:11(10):102-164

Interventions in CHD

success story!



George Bernard Shaw
1856 -1950

"Science is always wrong. It never solves a problem without creating ten more……"

Any Questions?

"Look, if it was electric, could I do this?"