

Acute Cardiology update and a glimpse to the future

Adam de Belder
Sussex Cardiac Centre
Brighton
Amex March 2019

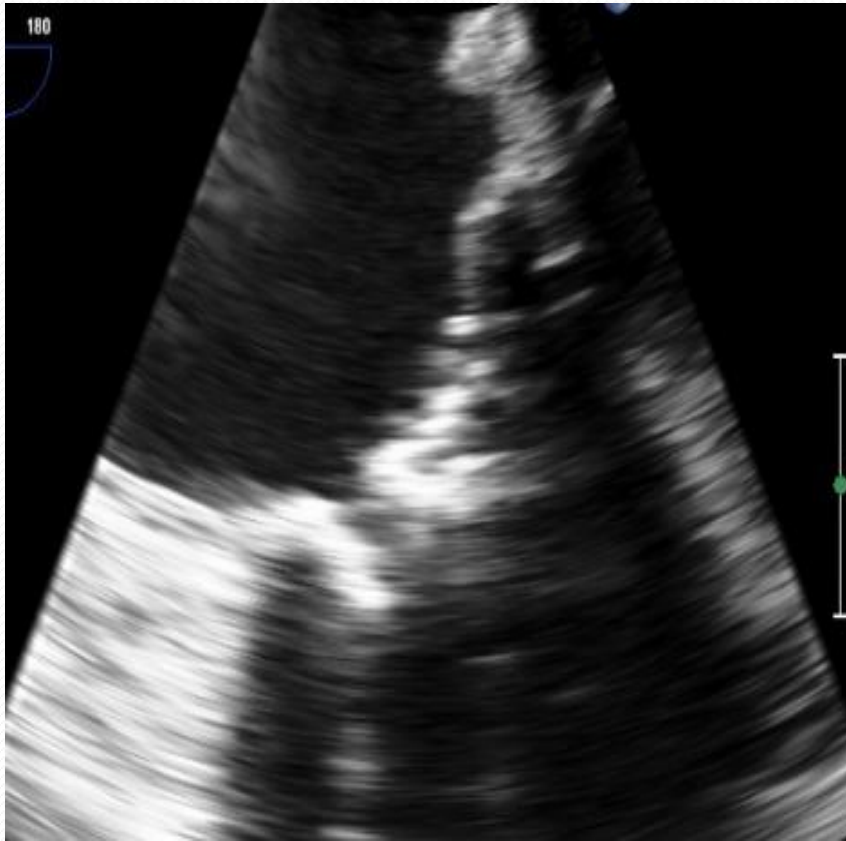


- A pot pourri of acute cardiology over the year
- Some important developments in different fields

icu

- 48 years
- Weight loss, abdominal swelling,
- Extremely unwell, hypotensive, liver and renal failure, oedema to chest wall
- Thoracotomy scar – unknown reason
- Ca-125 very high
- Ascites and apparent omental disease, concerning for malignancy.
- Extensive ground-glass shadowing affecting all lobes of both lungs.
- Palliation

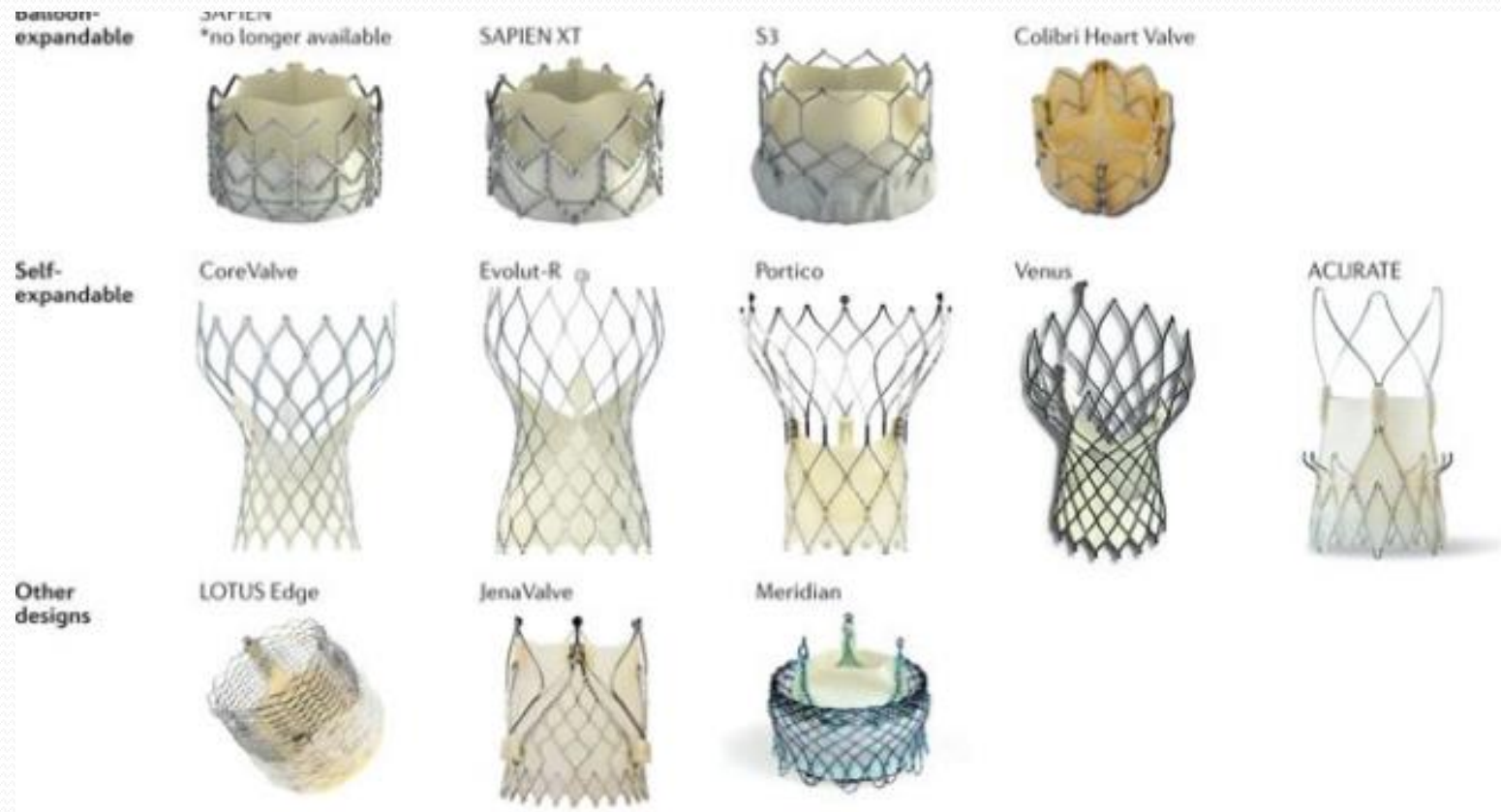
TOE - Tricuspid valve – severely stenosed



Valvuloplasty and Sapien percutaneous valve



TAVI – aortic valve disease

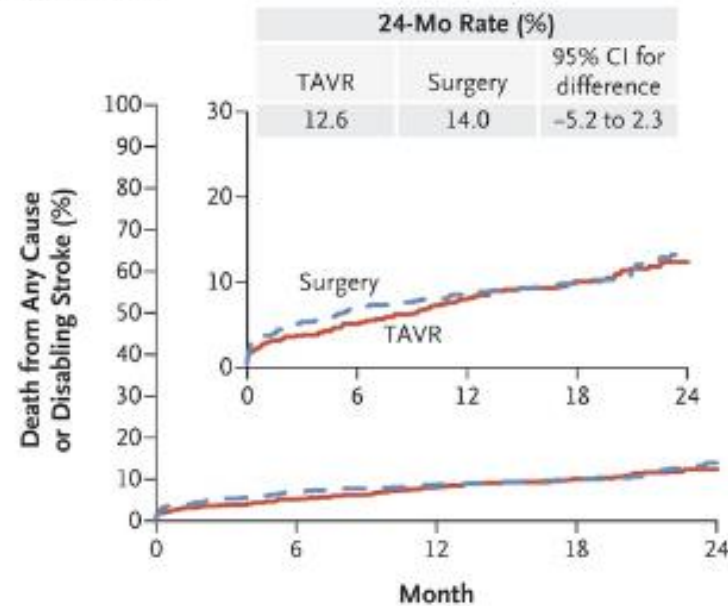


Surgical or Transcatheter Aortic-Valve Replacement in Intermediate-Risk Patients

Michael J. Reardon, M.D., Nicolas M. Van Mieghem, M.D., Ph.D., Jeffrey J. Popma, M.D., Neal S. Kleiman, M.D., Lars Søndergaard, M.D., Mubashir Mumtaz, M.D., David H. Adams, M.D., G. Michael Deeb, M.D., Brijeshwar Maini, M.D., Hemal Gada, M.D., Stanley Chetcuti, M.D., Thomas Gleason, M.D., *et al.*, for the SURTAVI Investigators*

NEJM
2017
376:1321

B Primary Outcome



No. at Risk

TAVR	864	755	612	456	272
Surgery	796	674	555	407	241

Percutaneous mitral valve treatment

- It's not round nor "D" shaped – it's asymmetric
- It's not flat – it's saddle-shaped (3D)
- Its annulus is not rigid – it's "dynamic"
- It's not passive – it contracts, reducing valve area during systole
- It's a high pressure closure valve, not a high pressure opening valve
- It' has 24+ chords; it calcifies with age (MAC)
- It's relatively easy to block aortic outflow
- It's easier to form thrombus on than the AV
- It has a much larger annulus than the AV
- Its annulus changes size as the heart fails
- MR is not one disease!



Adapted from Meredith I, TCT 2015

Mitral valve treatment

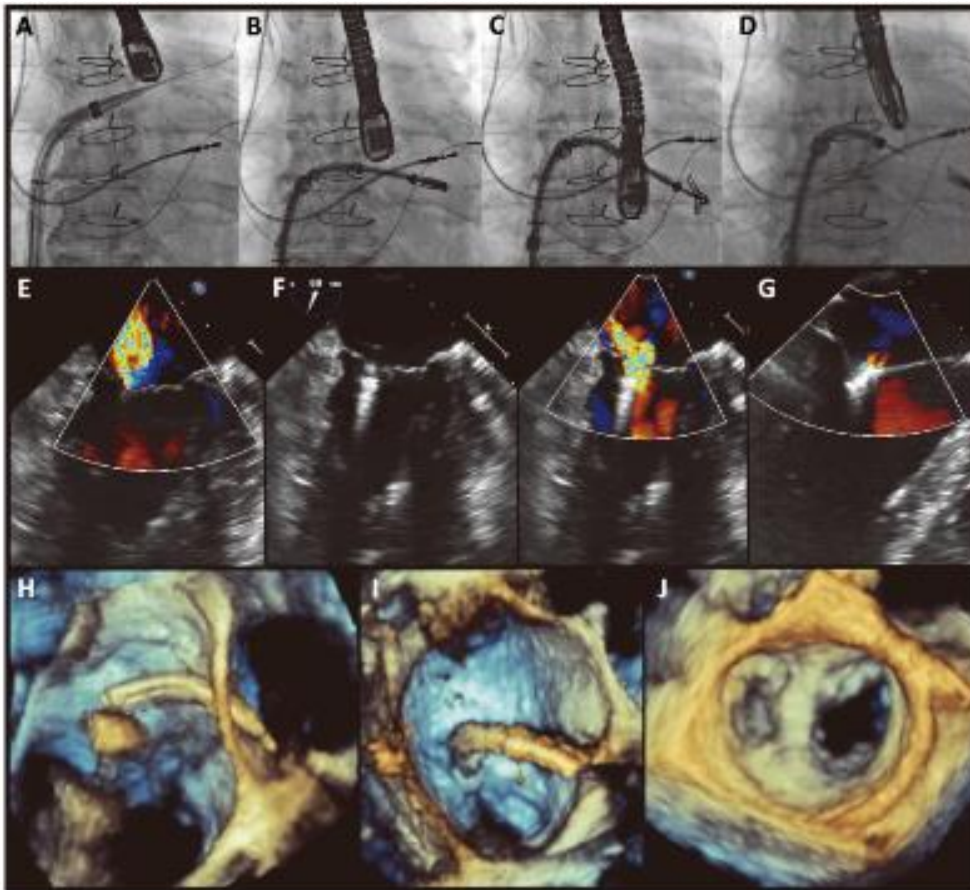
Primary degenerative MR is a disease of the valve and we strive to fix this before the ventricle deteriorates

Secondary or functional MR is a disease of the ventricle and it is already too late to prevent deterioration

Treatments for mitral regurgitation



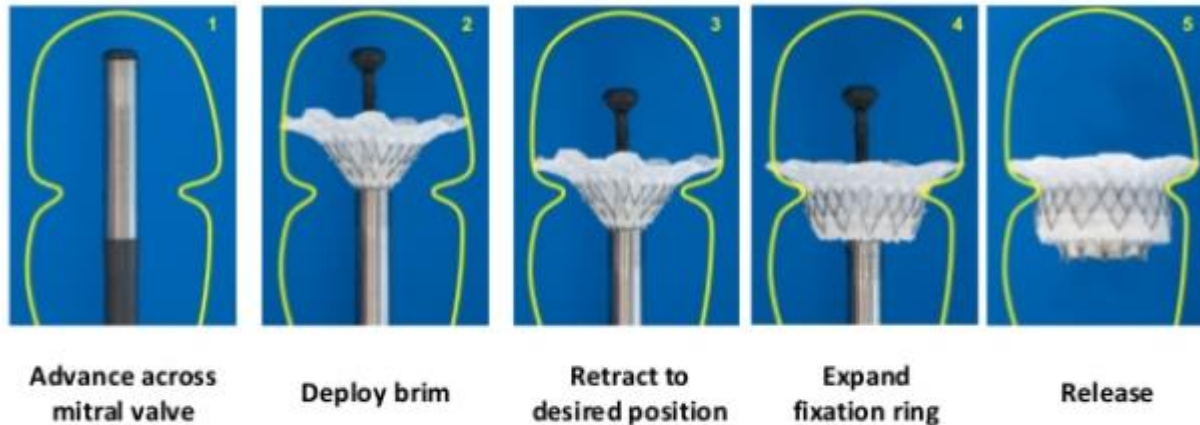
Mitraclip deployment



Mitral valve annuloplasty

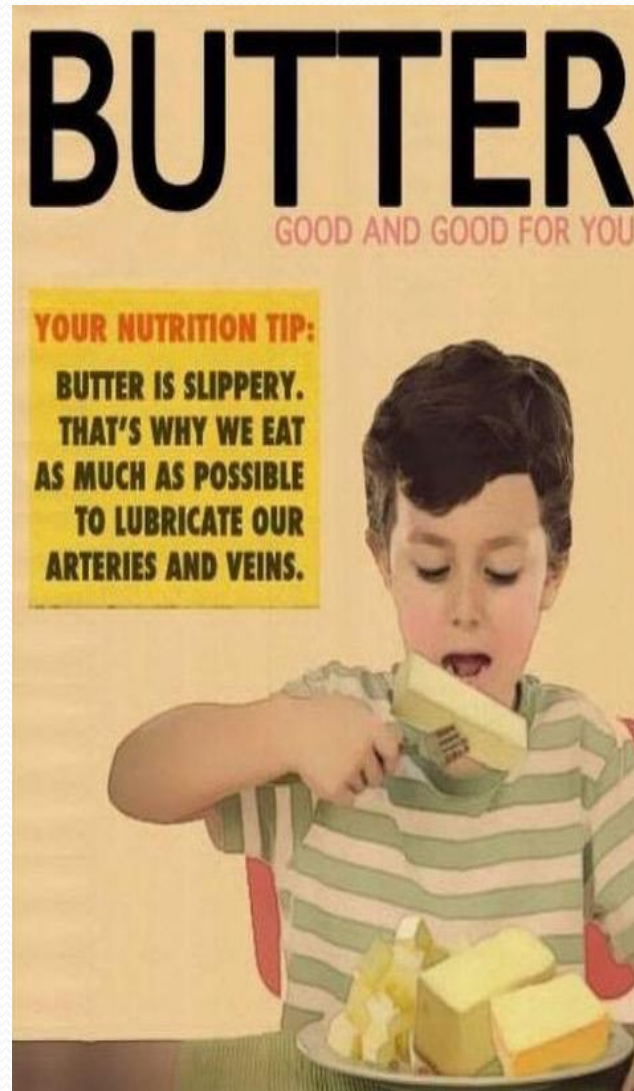


Percutaneous mitral valve replacement

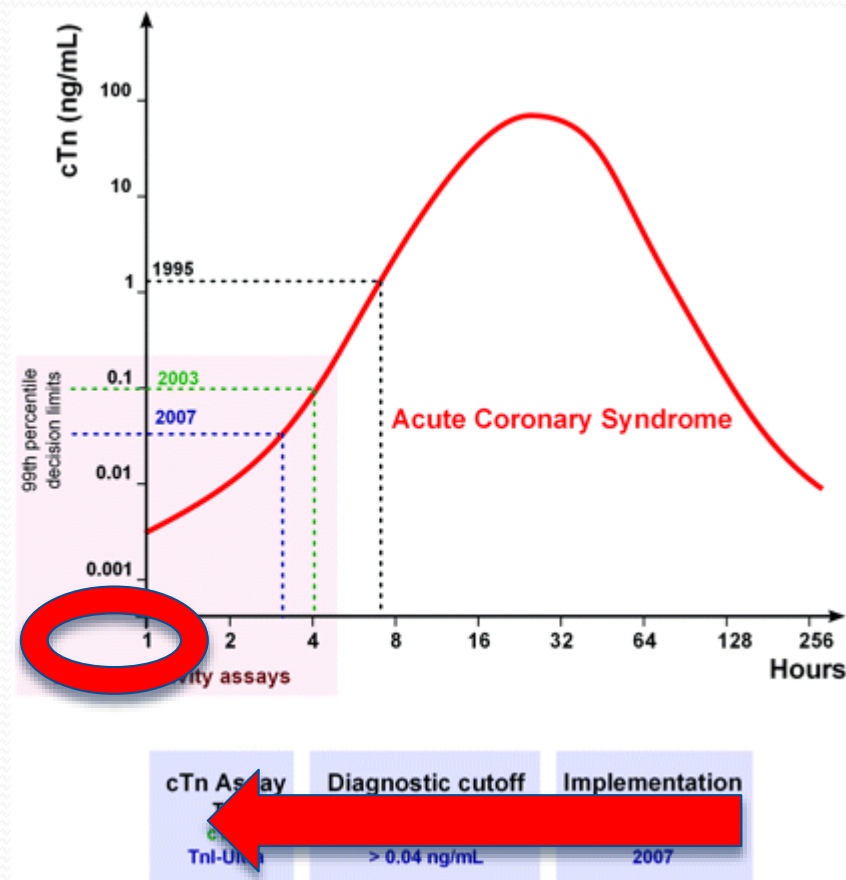


- Hydraulic mechanism provides for controlled, precise deployment
- No need for rotational alignment
- No need to hunt for leaflets

Acute coronary disease



When troponin rises



Presented to ED



- 64 year old lady fit and well
- Goes to gym x3/week, walks dog daily
- PC :Chest tightness/pain - 4 episodes in one week
 - 1st walking from train station to car
 - 2nd on the cross trainer in the gym
 - 3rd walking the dog
- All <5mins duration relieved by rest
 - 4th woke her from her sleep lasted 10minutes went to ED
- Clinical Diagnosis ??
- **Unstable Angina admit to cardiology**

Troponins

Serum troponin T - (across all investigations) [ng/L] ▼		
Reference range: (0 - 14) Units: ng/L		
Sample Received Date	Sample ID	Value
11 Feb 2018 13:08:00	0018E032075	*16.92
11 Feb 2018 15:20:00	0018E032100	*22.43

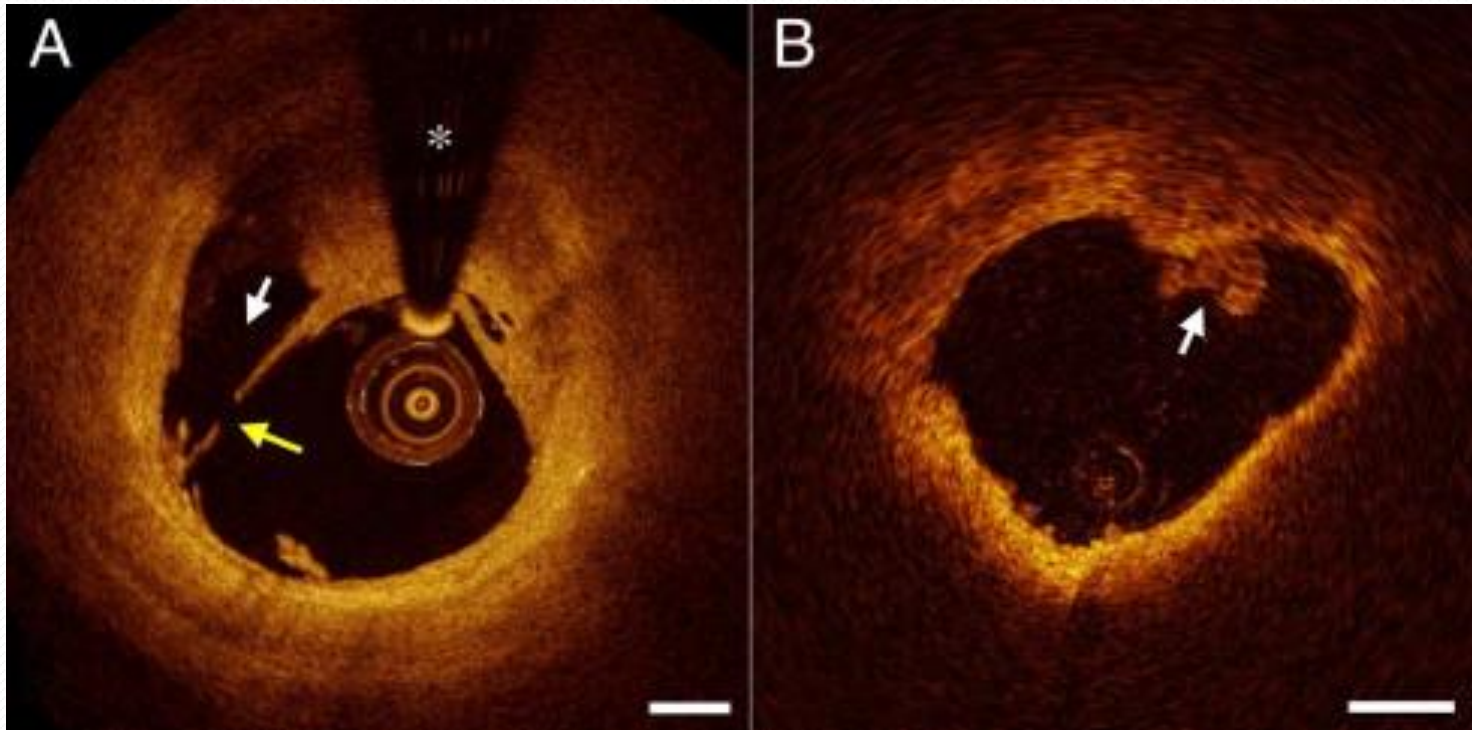
- Lets do the Maths ...
- $T_0 - T_1 \Delta =$
- 5.51
 - If the answer is 5 or more – **Rule In**
- Calculate percentage %
 - $(T_1 - T_3 \Delta) \div T_1 = \times 100 = \text{Percentage rise \%}$
 - $5.51 \div 16.92 \times 100 = 33\%$ **Rule In >20%**

However she was discharged home.
She came back 4 days later...

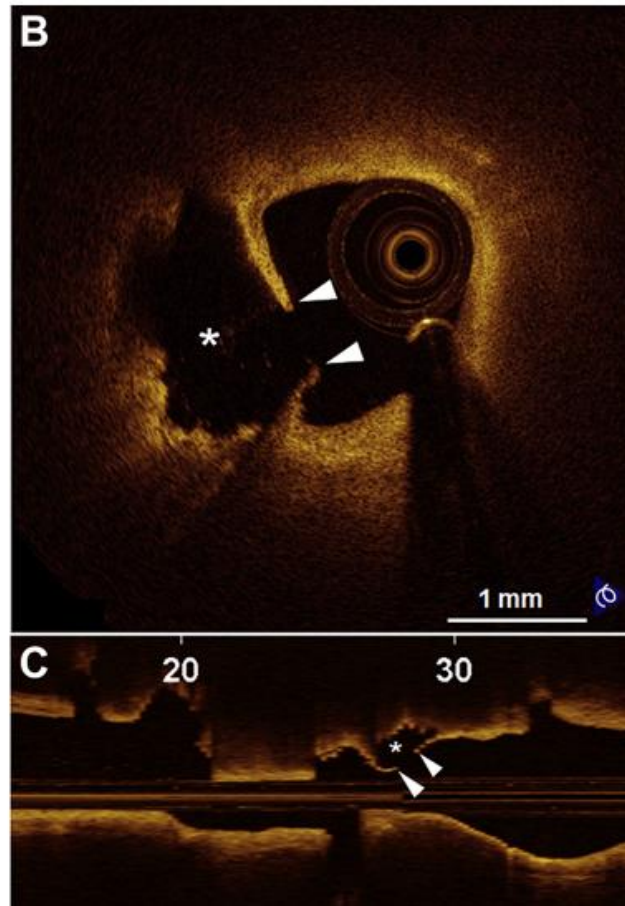
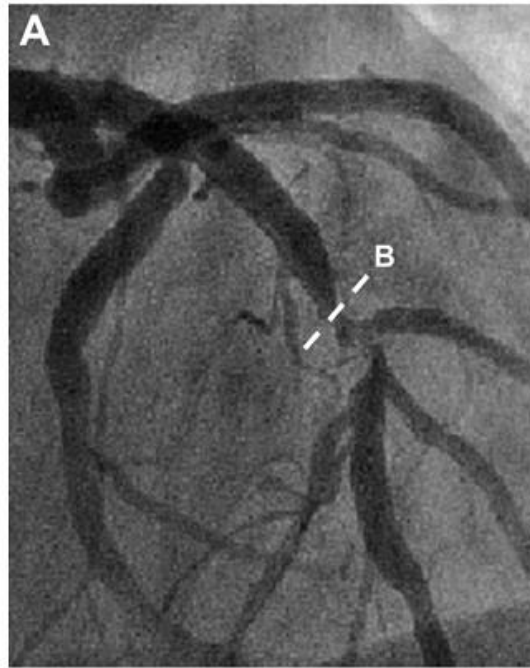
Serum troponin T - (across all investigations) [ng/L] ▼		
Reference range: (0 - 14) Units: ng/L		
Sample Received Date	Sample ID	Value
11 Feb 2018 13:08:00	0018E032075	*16.92
11 Feb 2018 15:20:00	0018E032100	*22.43
15 Feb 2018 13:51:00	0018E035663	*591.60

- Coronary Angiogram showed severe ostial triple vessel disease for IP CABG

Optical coherence tomography



Plaque rupture



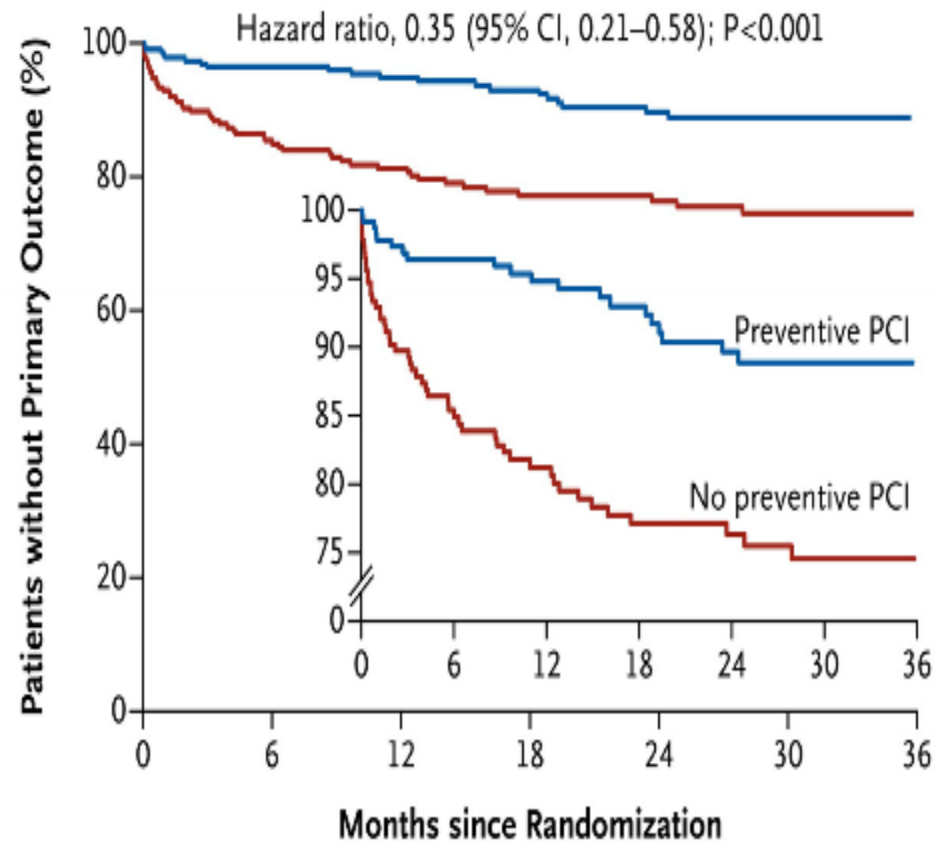
Primary angioplasty for STEMI

- In-hospital mortality – 1-2%
- Pathways to reduce time to stent
- Role of thrombectomy
- Role of glycoprotein IIb/IIIa inhibitors
- Radial approach

Randomized Trial of Preventive Angioplasty in Myocardial Infarction

David S. Wald, M.D., Joan K. Morris, Ph.D., Nicholas J. Wald, F.R.S., Alexander J. Chase, M.B., B.S., Ph.D., Richard J. Edwards, M.D., Liam O. Hughes, M.D., Colin Berry, M.B., Ch.B., Ph.D., and Keith G. Oldroyd, M.D. for the PRAMI Investigators

N Engl J Med 2013; 369:1115-1123 | September 19, 2013 | DOI: 10.1056/NEJMoa1305520



No. at Risk

Preventive PCI	234	196	166	146	118	89	67
No preventive PCI	231	168	144	122	96	74	50



Randomized Trial of Complete Versus Lesion-Only Revascularization in Patients Undergoing Primary Percutaneous Coronary Intervention for STEMI and Multivessel Disease: The CvLPRIT Trial

J Am Coll Cardiol. 2015;65(10):963-972. doi:10.1016/j.jacc.2014.12.038

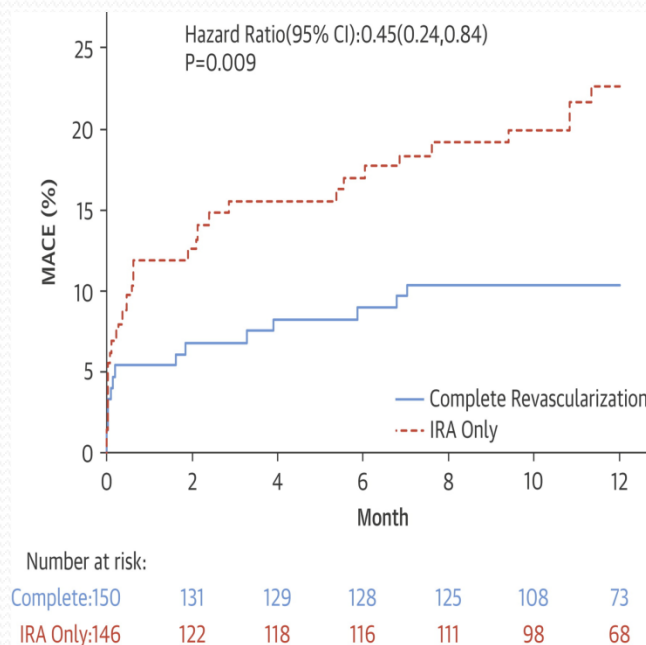


Figure Legend:

Kaplan-Meier Curves

Cumulative event rate for IRA-only versus complete revascularization groups. CI = confidence interval; other abbreviations as in Figure 1.

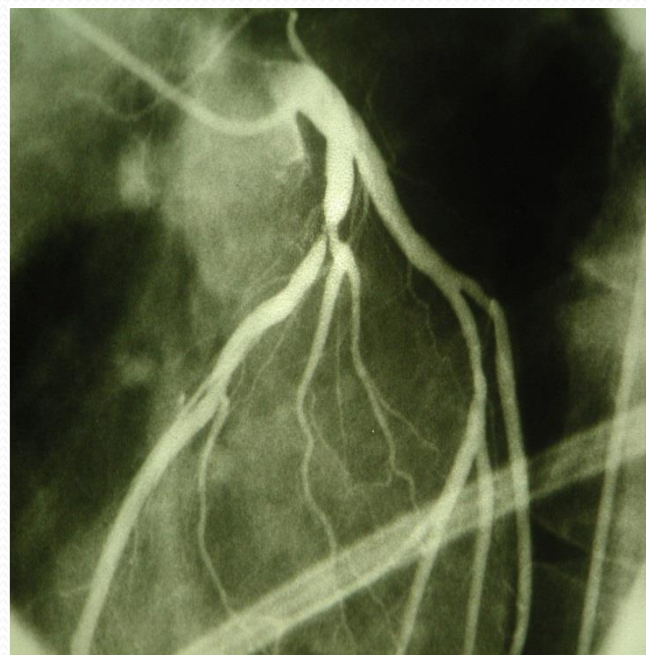
challenging situations

- Coronary dissection
- Calcific occlusions
- Giant thrombus
- 'Embolic' infarction
- Very elderly patients
- Patients with co-morbid conditions

SUDDEN CARDIAC ARREST - AN ISSUE FOR INTERVENTIONAL CARDIOLOGIST

- Sudden cardiac arrest is usually a coronary event

CAG (84)	Urgent
Normal (20%)	17
Nonobstructive CAD	7 (8%)
Obstructive CAD 60 (71%)	
Single vessel	22
Multivessel	37
Isolated LM	1
Coronary occlusion	40 (48%)



Spaulding CM. N Engl J Med 1997;336:1629-33.

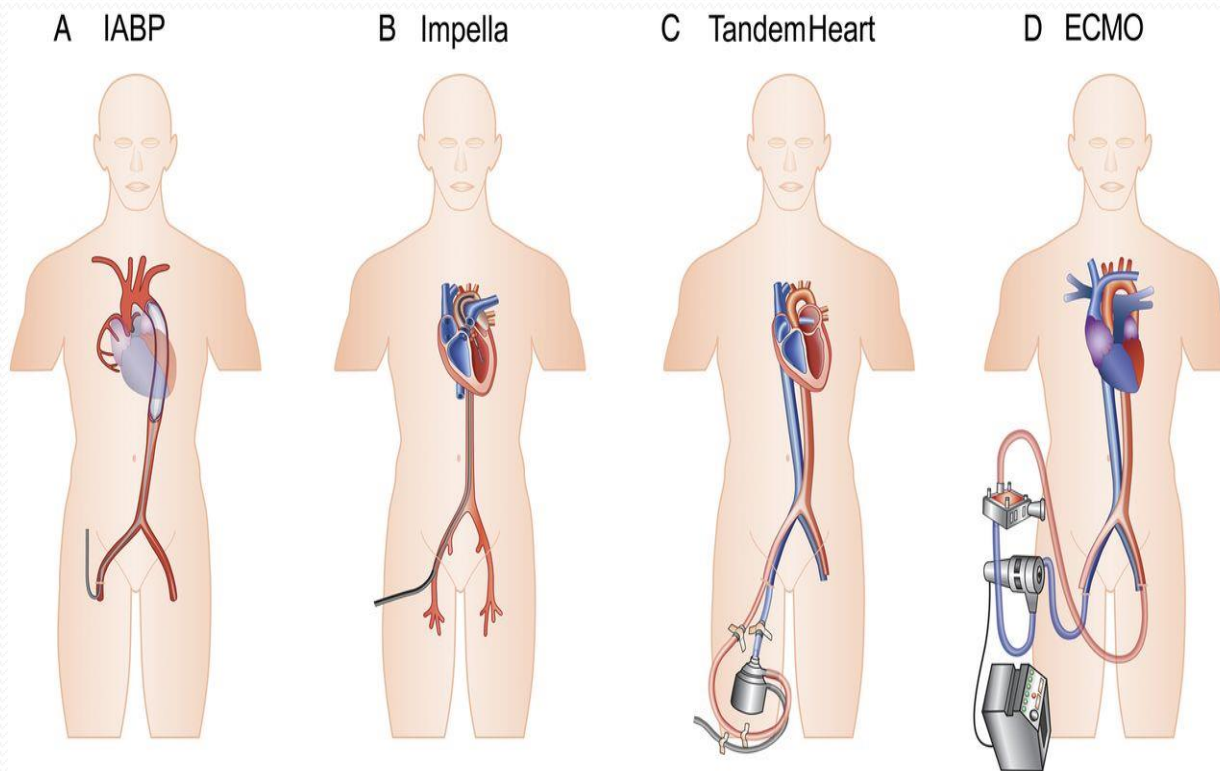
OOHA

- All STEMI should have immediate angiography and treatment
- Non-ST elevation OOHA events should have invasive investigation, but not necessarily immediately (as is the case with non-STEMI currently). A RCT is in progress.

Cardiogenic shock

- Poor outcomes
- Bridge to destination therapy
- ECMO

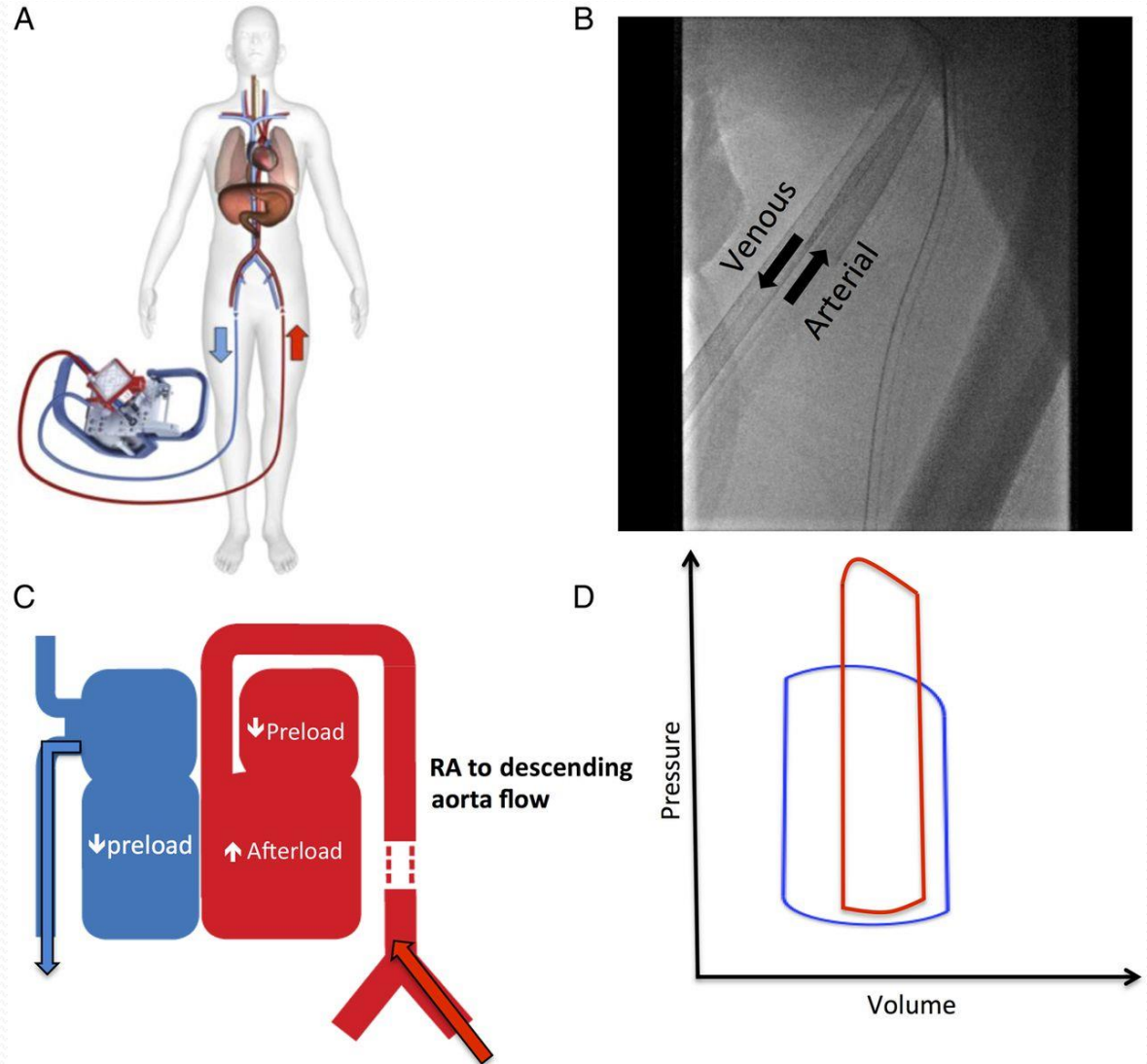
Percutaneous assist devices in cardiogenic shock



Werdan K et al. Eur Heart J
2013;eurheartj.eht248

ECMO

- No RCTs



ECMO

- Relatively quick and easy insertion
- Full circulatory support up to 4l/min
- But no decrease in afterload
- No RCTs
- Requirement for perfusionists
- Easier systems in development

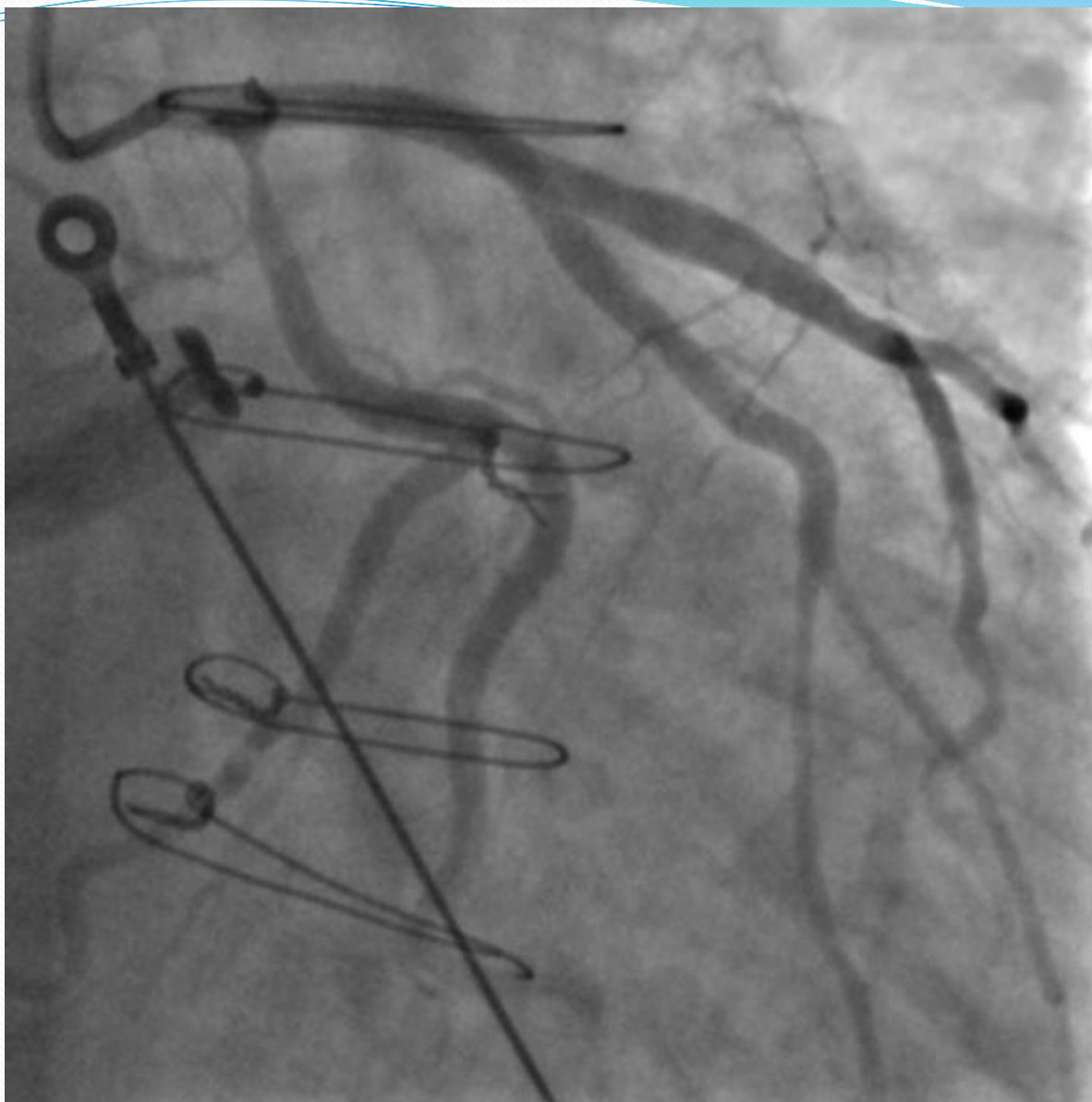
ECMO

- Sheu et al
- Crit Care Med 2010;38:1810-17
- Single centre retrospective series
- N=219 CS post PPCI (2002-2009)
- Historical control of 115 pts (1993-2002)
- 30 day mortality with ECMO 35% (vs 60% historical control)

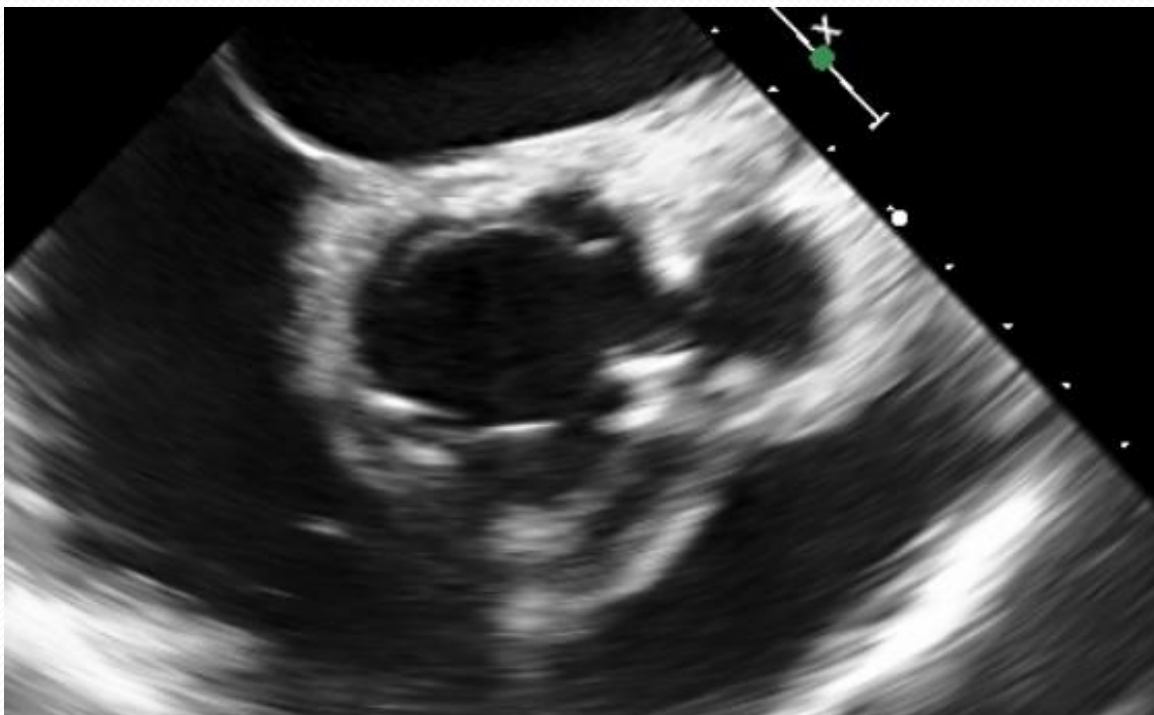
Future research in acute coronary syndromes

- Mortality is low, reducing myocardial injury is the aim now
- Role of antithrombotics (triple therapy), antiplatelets, stents
- Role of cell therapy in myocardial repair
- Management of life threatening complications
- Role of hypothermia
- Targeting risk factor control
- Public education programmes
- ..so much to do





- 
- No better
 - Continued to deteriorate with sepsis
 - Blood cultures – E.coli grown

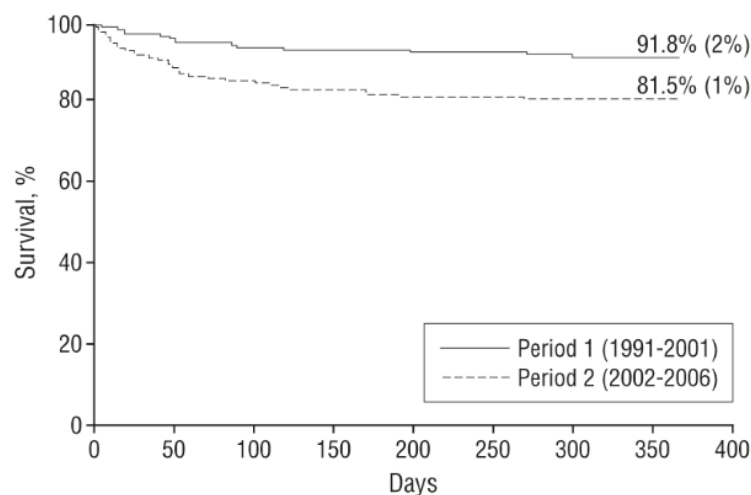


ENDOCARDITIS

- Diagnosis nearly always delayed
- Morbidity and Mortality rates remain high
- MDT approach - cardiologist, microbiologist, imaging expertise, cardiac surgeon
- Surgical intervention - timing

Dramatic Reduction in Infective Endocarditis-Related Mortality With a Management-Based Approach

Elisabeth Botelho-Nevers, MD; Franck Thuny, MD; Jean Paul Casalta, MD; et al

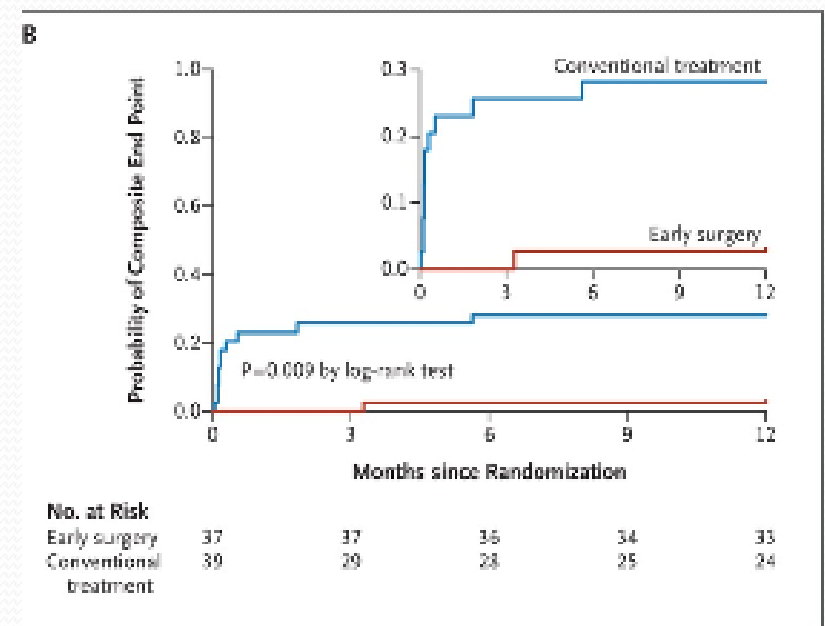
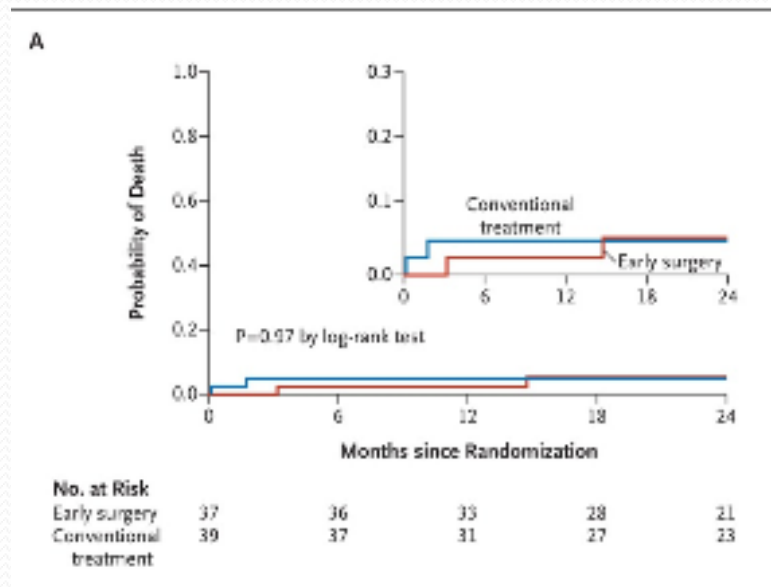


	Baseline	3 mo	6 mo	9 mo	12 mo
Patients at risk, No.					
Period 1	173	131	126	123	122
Period 2	160	149	148	147	144
Cumulative No. of deaths					
Period 1	0	23	28	30	30
Period 2	0	9	10	11	13

Arch Intern Med. 2009;169(14):1290-1298.

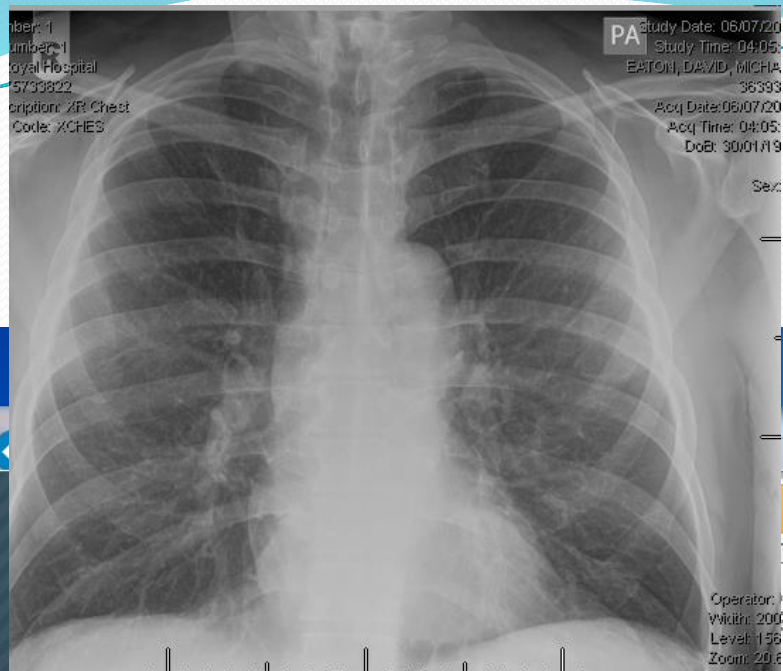
Early Surgery versus Conventional Treatment for Infective Endocarditis

Duk-Hyun Kang, M.D., Ph.D., Yong-Jin Kim, M.D., Ph.D., Sung-Han Kim, M.D., Ph.D., Byung Joo Sun, M.D., Dae-Hee Kim, M.D., Ph.D., Sung-Cheol Yun, Ph.D., Jong-Min Song, M.D., Ph.D., Suk Jung Choo, M.D., Ph.D., Cheol-Hyun Chung, M.D., Ph.D., Jae-Kwan Song, M.D., Ph.D., Jae-Won Lee, M.D., Ph.D., and Dae-Won Sohn, M.D., Ph.D.



July 17

- Silk trader
- Severe headache
- Night sweats
- Some weight loss
- A and E – CRP 69 ESR 32
- Diagnosis: temporal arteritis
- High dose steroids – instantaneous improvement
- Rheumatology follow up



PRINCESS ROYAL

Referred by: Unconfirmed

25mm/s 10mm/mV 100Hz 8.0 SP2 128.341 CID: 0

RED ECG ORDER: Page 1 of 1

Close

progress

- Travelling – forgot steroids – flare up
- CRP 42, ESR 68
- CT PET



OPD review

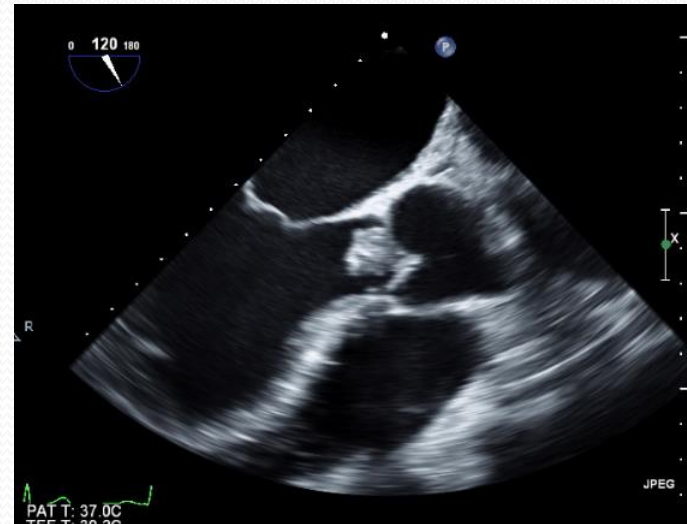
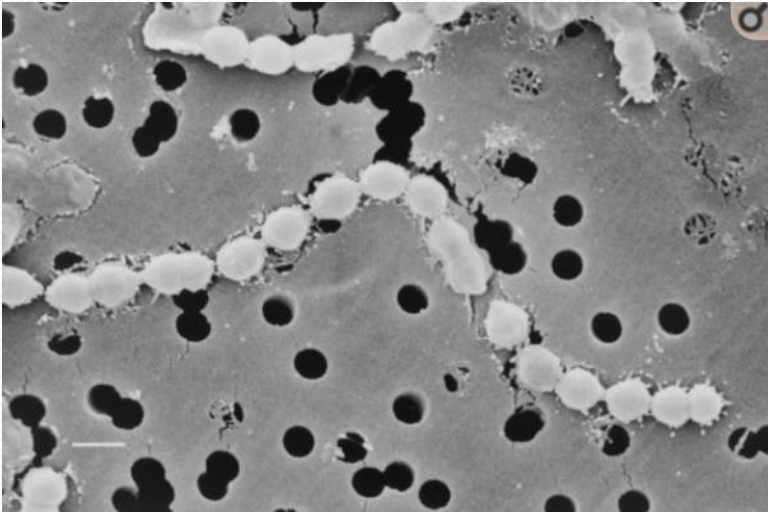
- Headaches returned
- Odd floaters in eye
- Inflammatory markers remained high

Ophthalmic review

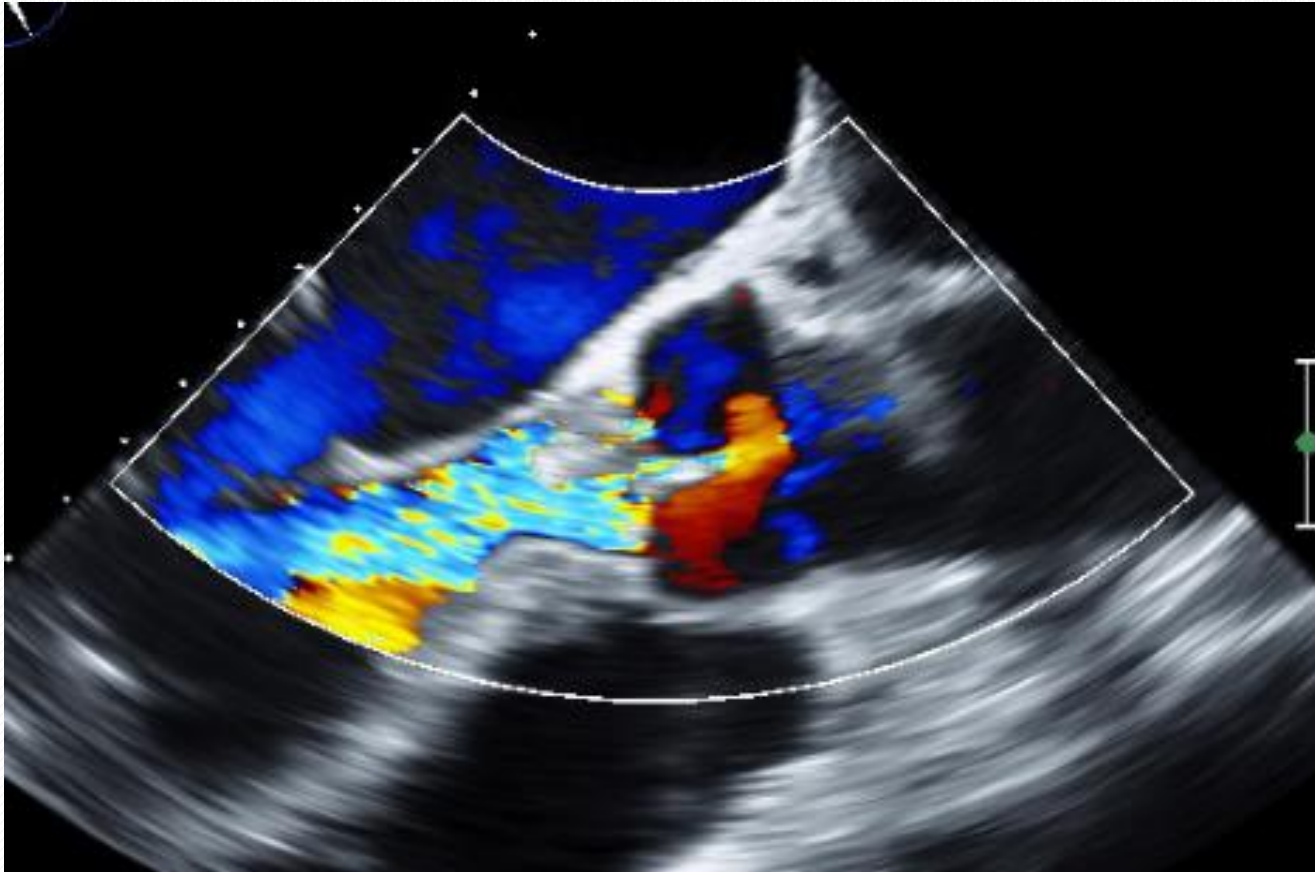


- Retinal hemorrhage with pale centre
- Flame shaped hemorrhage
- Coagulated fibrin, ischemia, inflammation and infection
- Infective endocarditis
- SLE, Leukemia, HIV retinopathy

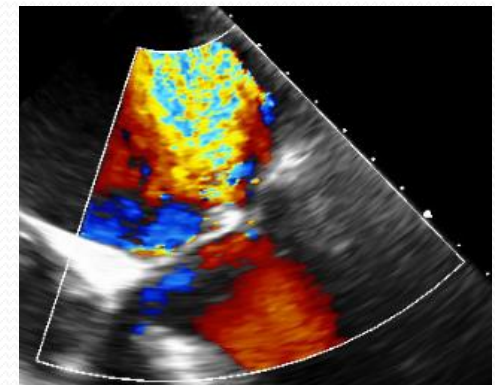
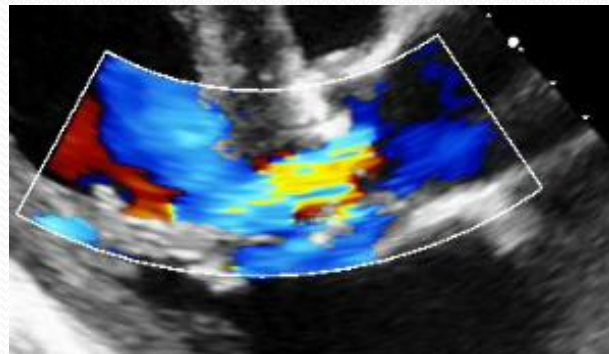
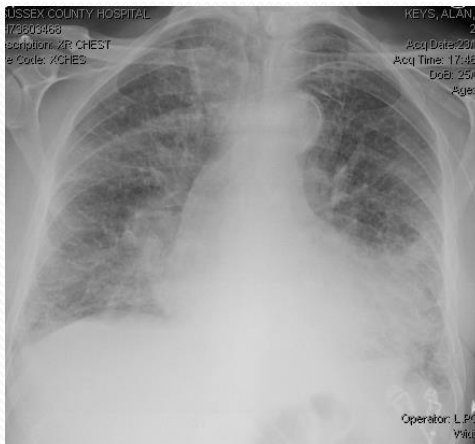
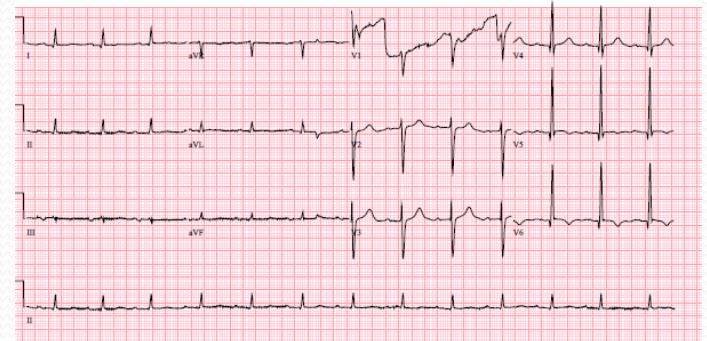
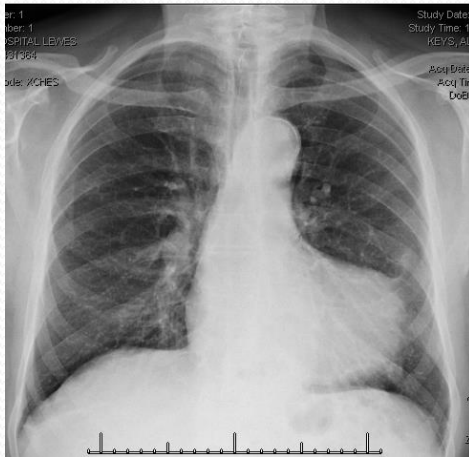
Streptococcus sinensis



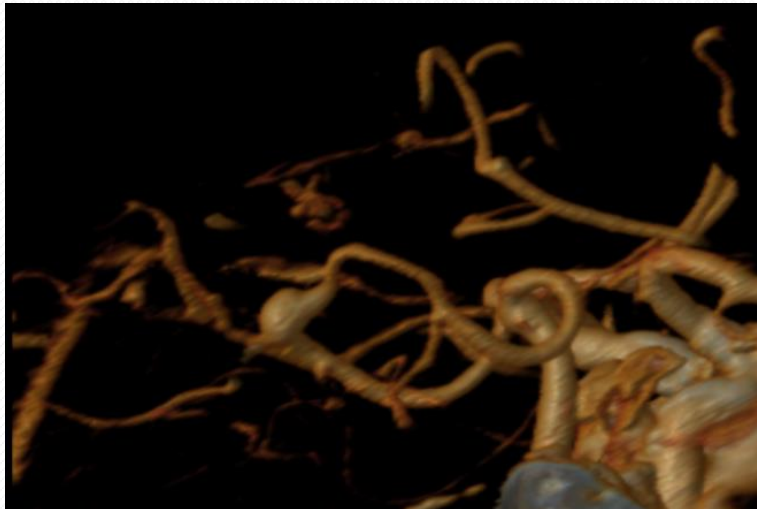
Severe aortic regurgitation



75 yrs weight loss, night sweats, cough trip to Myanmar, ESR 106



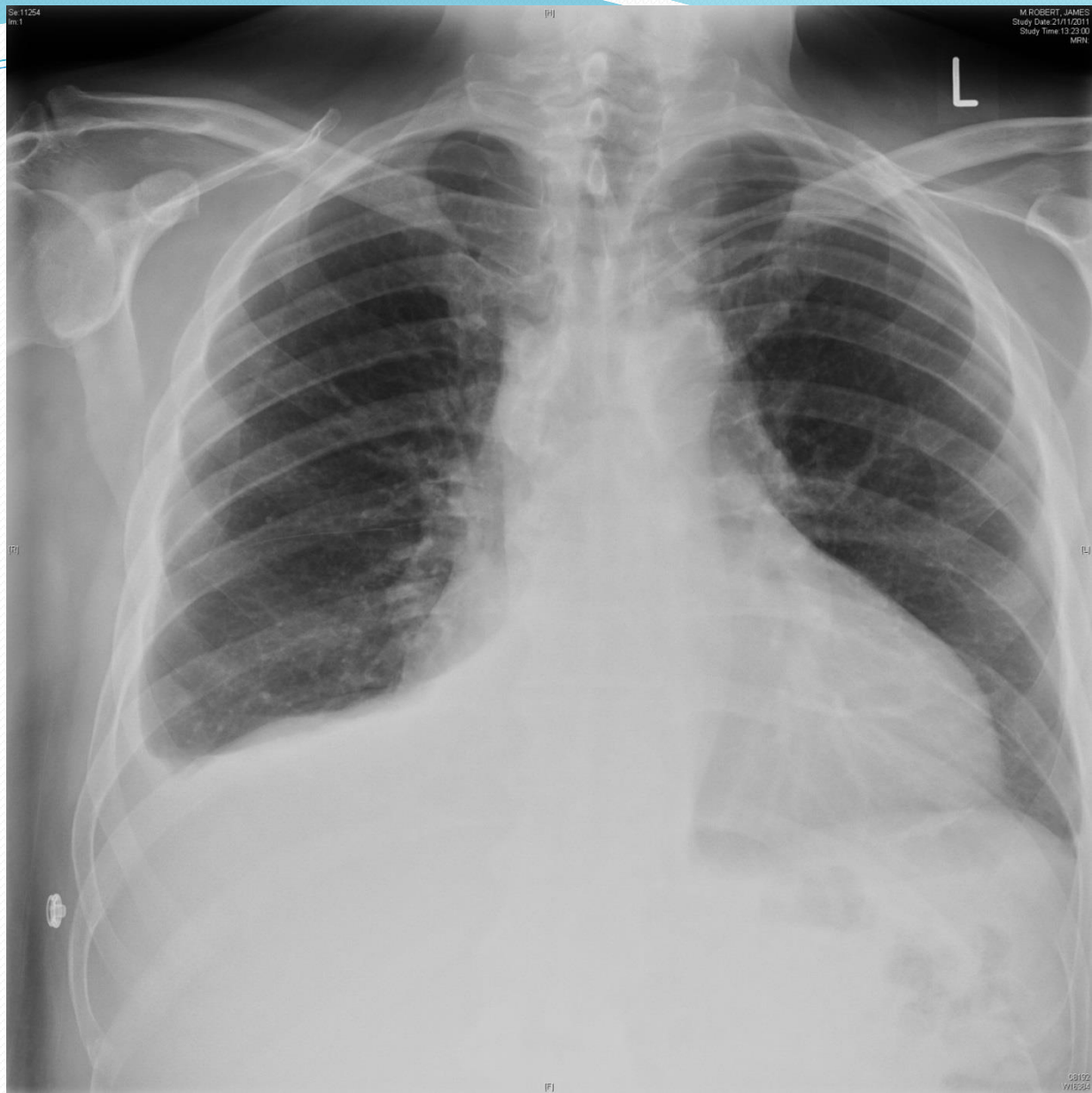
Collapse and visual loss



Mycotic aneurysm treated with coiling

Acute heart failure

- THR 2003
- SOBOE
- ?PND
- NT-pro BNP >1132 pg/ml
- BP 157/97
- Normal heart sounds
- Clear chest



Cardiac MR

- Moderately dilated LV
- LVEF 26% (severely impaired)
- Increased LV mass
- Septal wall thickness 13mm
- Moderately dilated RV
- RVEF 31% (severely impaired)
- Moderate pericardial effusion
- No LV/RV thrombus
- Diffuse LGE, especially basal inferior and lateral walls
- Impression:
 - **Infiltrative cardiomyopathy, most likely ...?**



National Amyloidosis Centre

- NT-pro BNP 197pMol/L,
- hsTrop-T 0.03µg/L
- Endomyocardial biopsy – negative for amyloid

Meanwhile... Gatwick Park Hospital

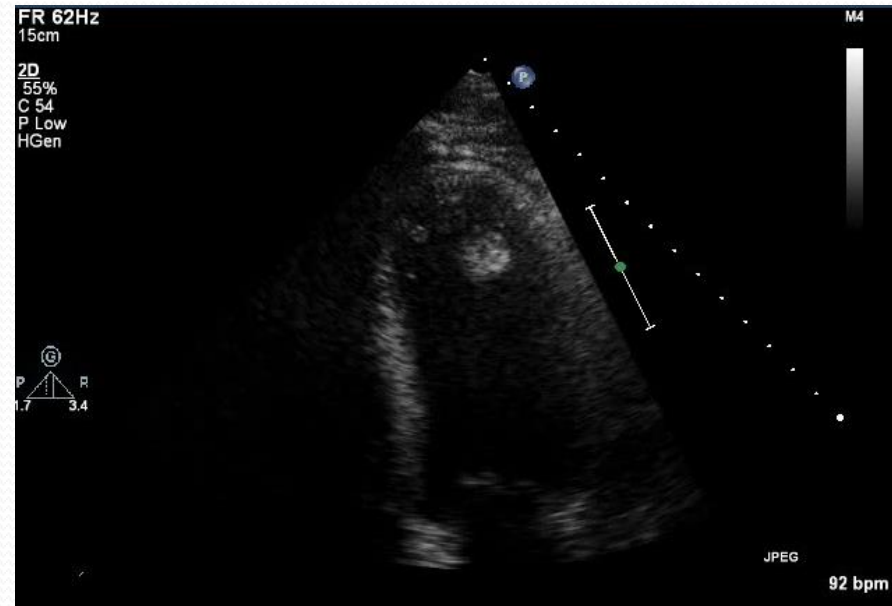
- Left Hip prosthesis subject to a recall
DePuy ASR implant
- Left Hip Revision 8th October
- Represents 31st October

Gross RVF clinically

- JVP to earlobe
- Ascites
- Massive oedema
- Weight 104kg

Acute Admission

- Echo LV Thrombus
 - Severely impaired LV function. EF 10%
 - Severely impaired RV function
 - Pulmonary hypertension (PAP 60mmHg)
 - Pericardial effusion 2.3cm



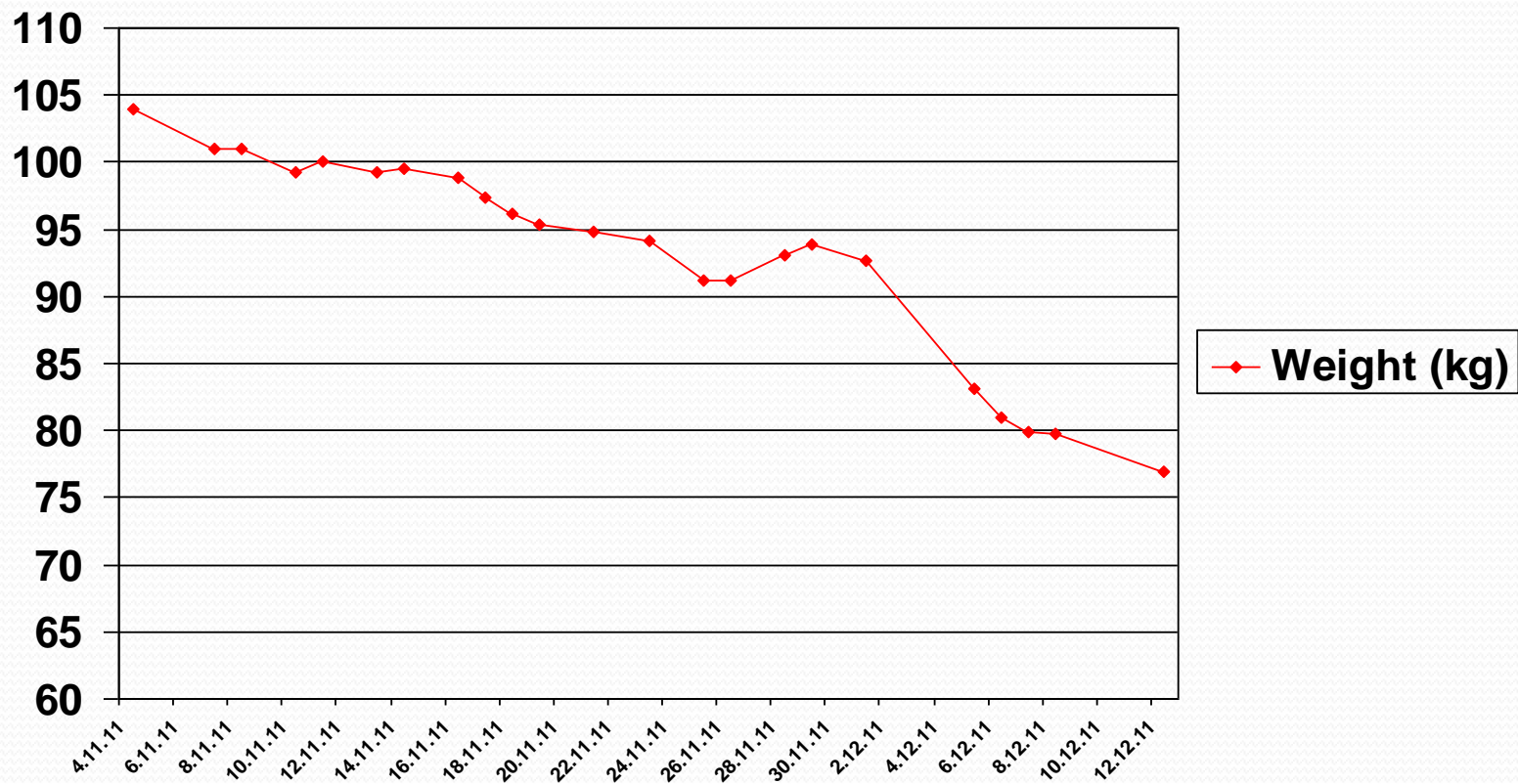
Acute Admission

November-December

- Treatment
 - Weight Restriction
 - Diuretics
 - ACEi (Ramipril)
 - MRA (Spironolactone)
 - BB (Bisoprolol)
 - Digoxin
 - Dobutamine (28/11/11-7/12/11)

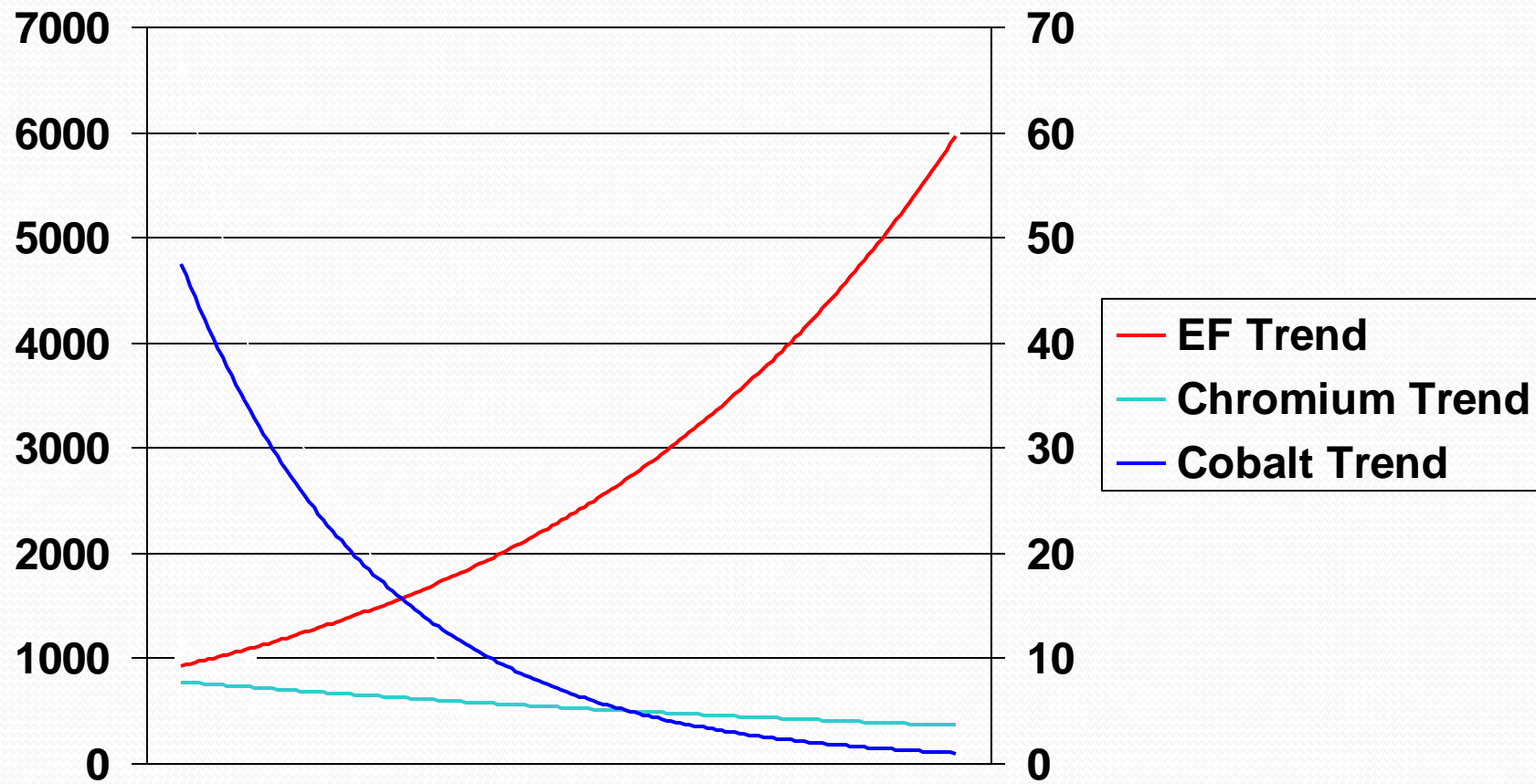
Acute Admission

November-December 2011



Chromium/Cobalt Levels

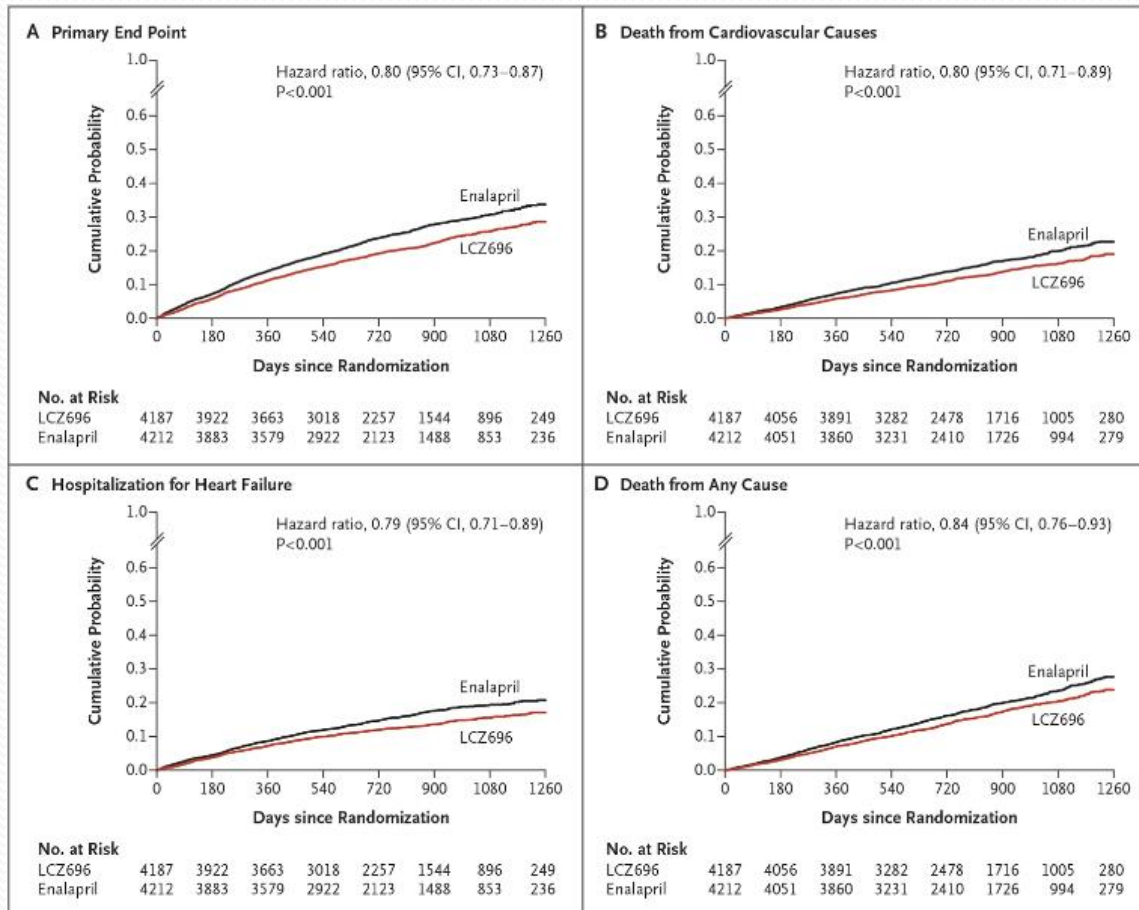
- Action limit (>7ppb):
 - Chromium >134nmol/L
 - Cobalt >119nmol/L
- Mr RM - October 2011:
 - Chromium **1160** nmol/L
 - Cobalt **6610** nmol/L
- Mr RM - September 2012:
 - Chromium 386 nmol/L
 - Cobalt 121 nmol/L



HEART FAILURE

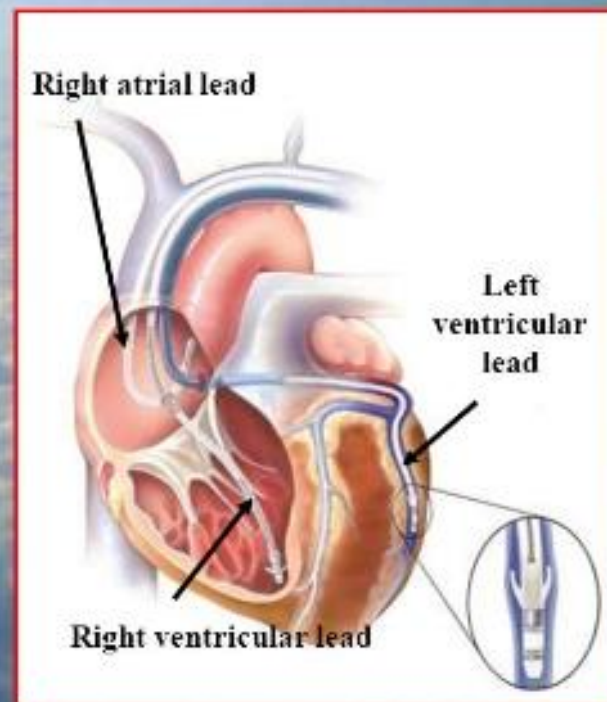
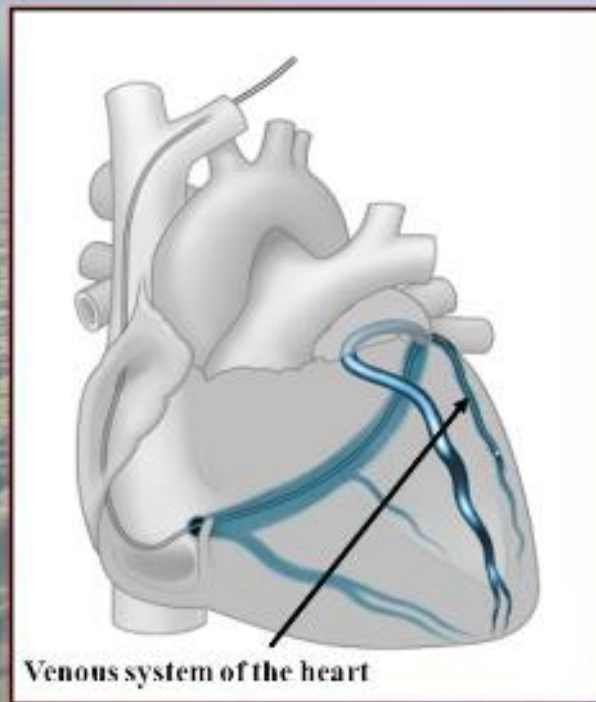
- ACEI or AII blockers
- Beta blockers
- Ivabradine (if in sinus rhythm)
- Spironolactone/Eplerenone

Entresto (sacubitril (neprilysin inhibitor) and valsartan

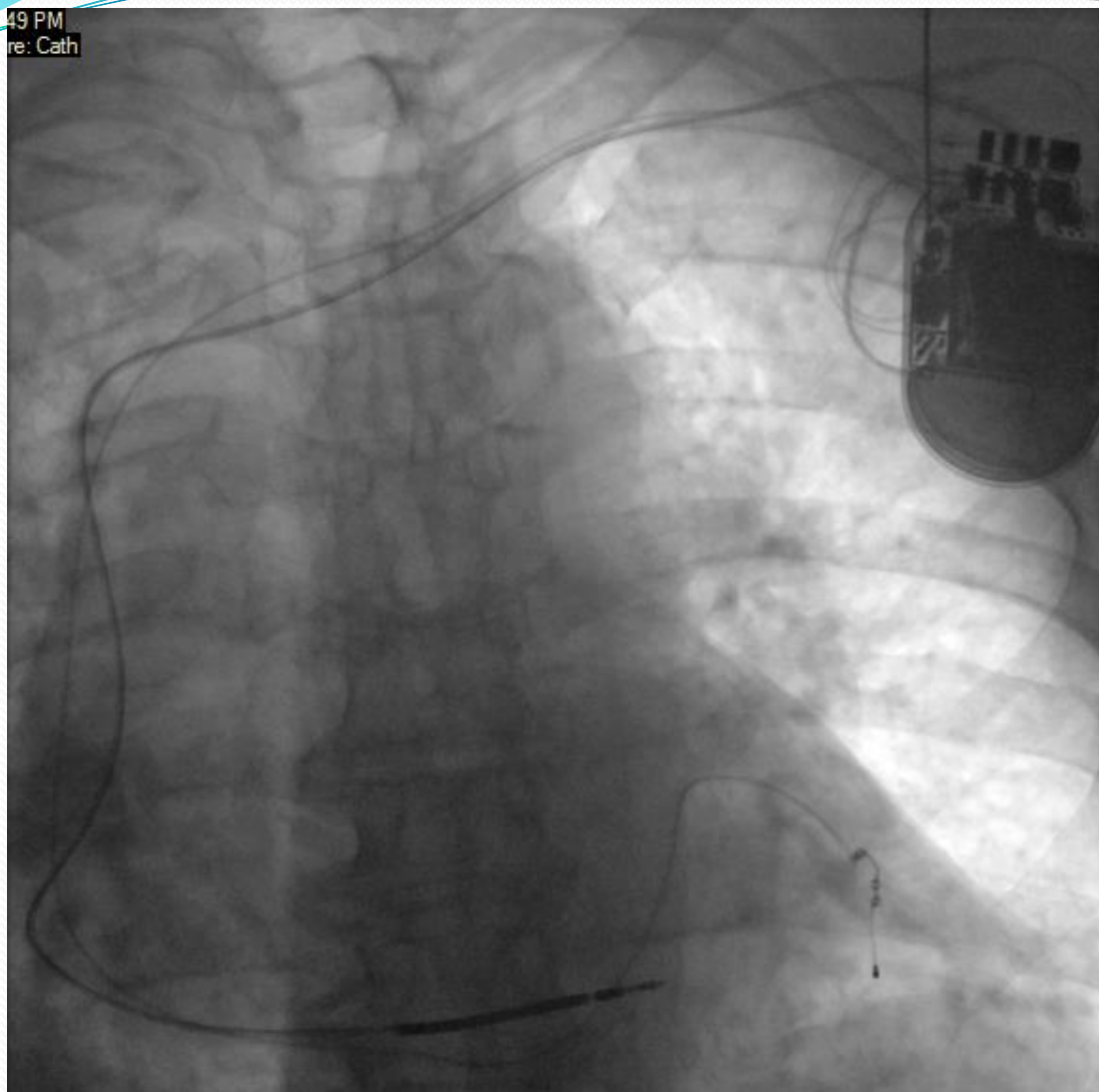


LBBB – preferably greater than 150ms

Cardiac Resynchronization Therapy (CRT)



49 PM
re: Cath

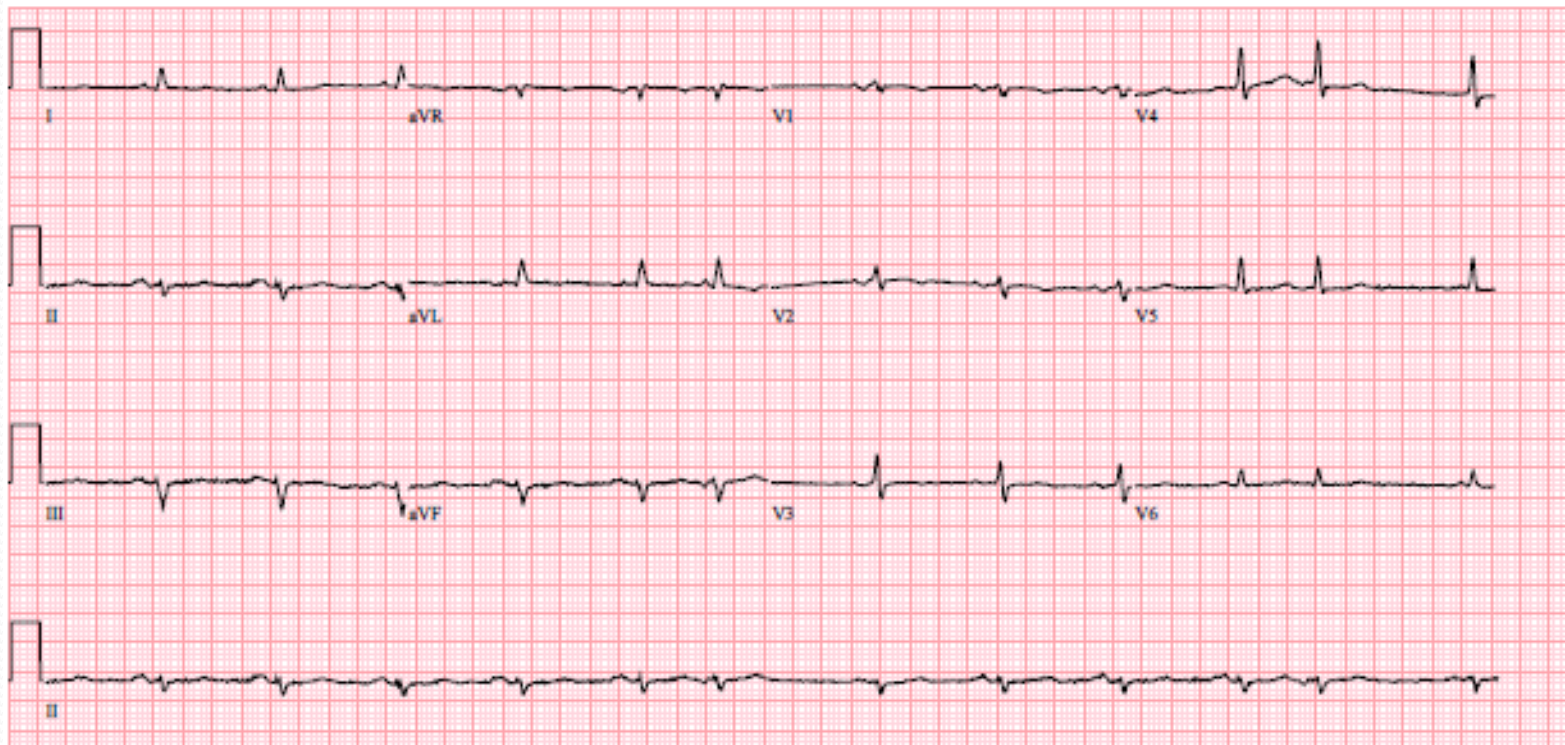


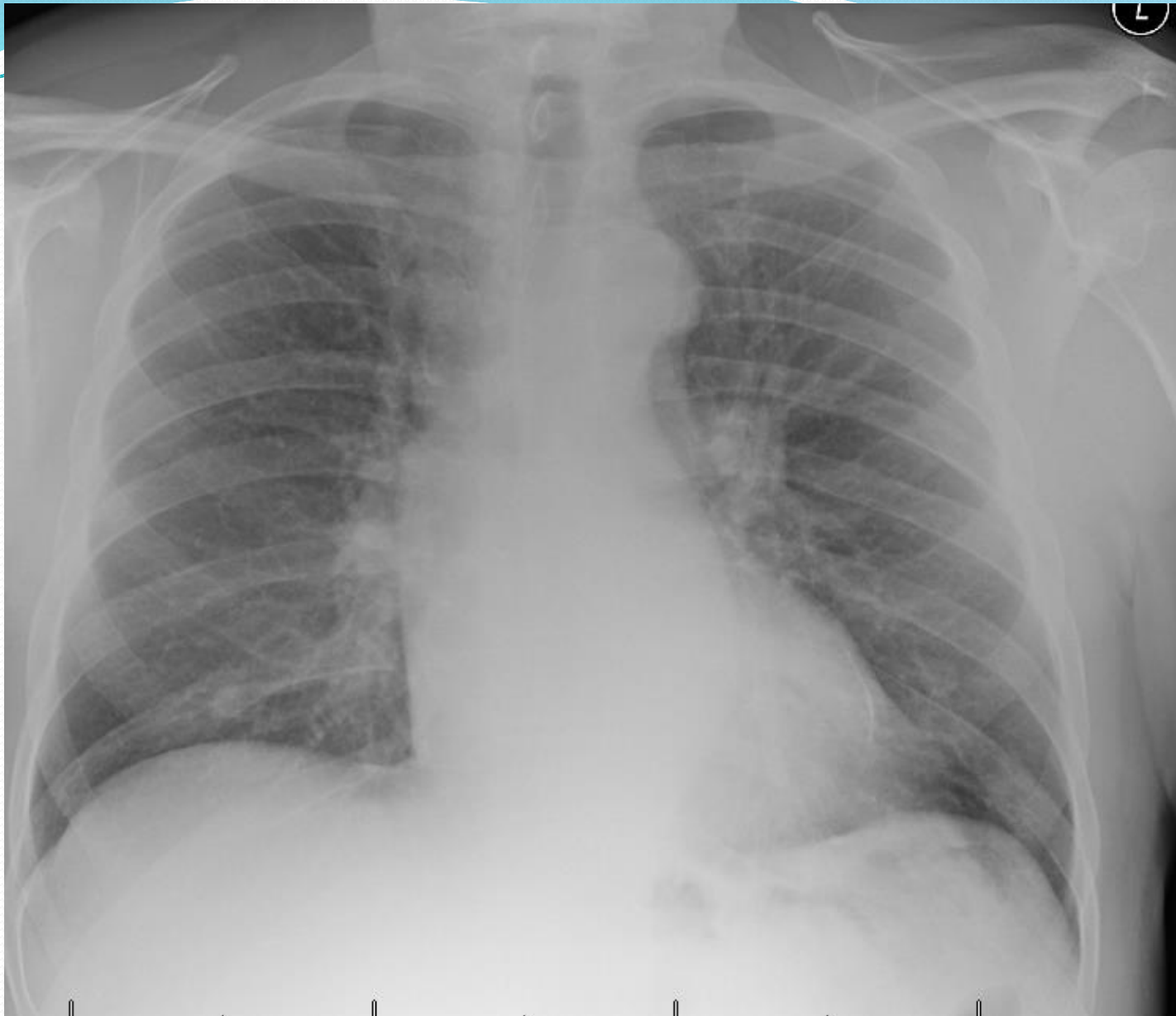
Heart failure

- Dedicated MDTs
- Community teams
- Discipline to treatment
- Exercise programmes

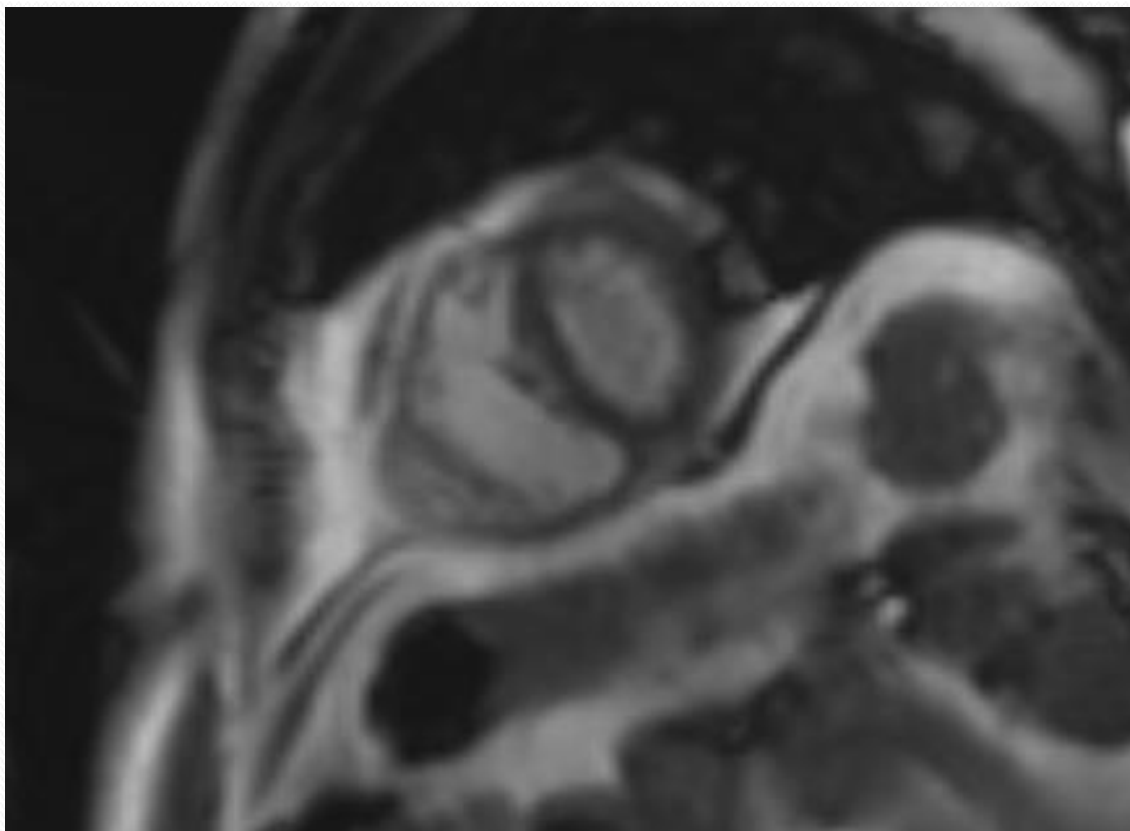
IH 68 yrs

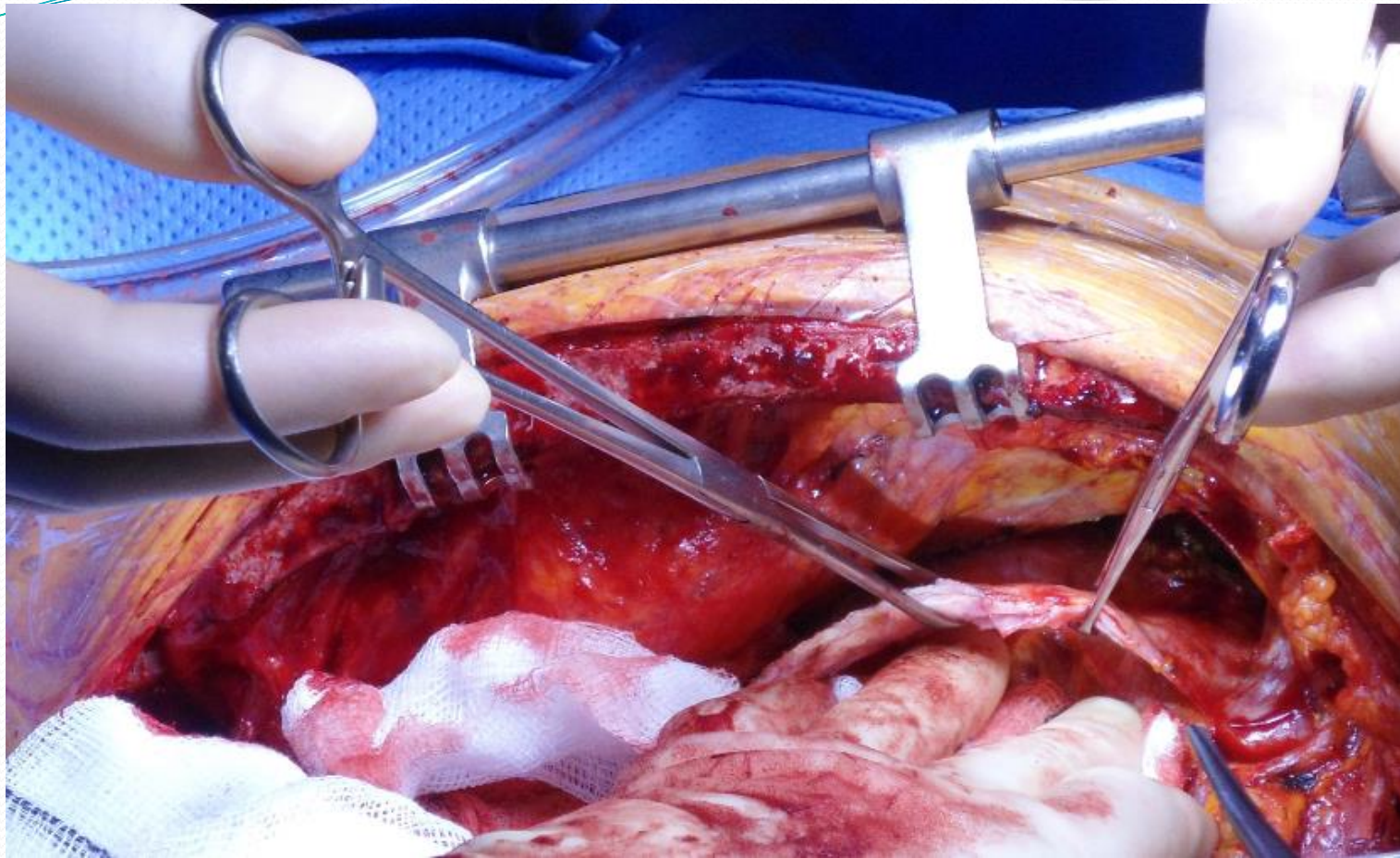
- Exertional SOB
- Longstanding
- AF, venous pressure up
- Echo normal LV function biatrial dilatation



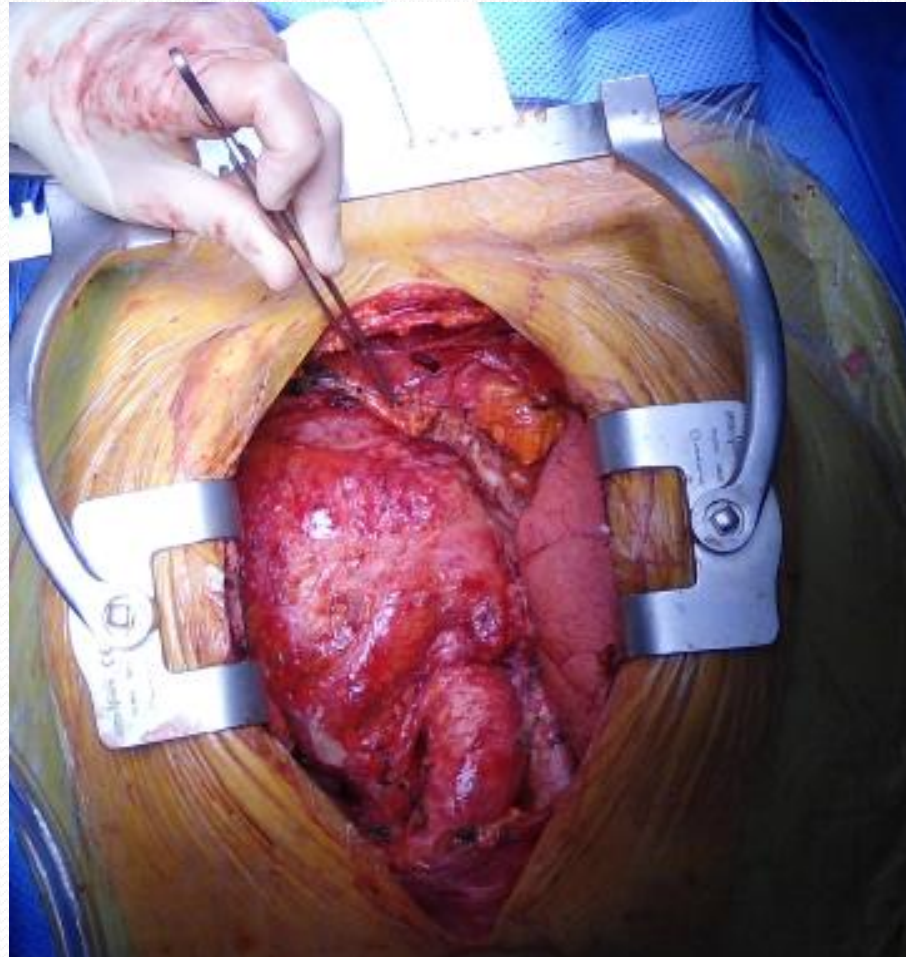




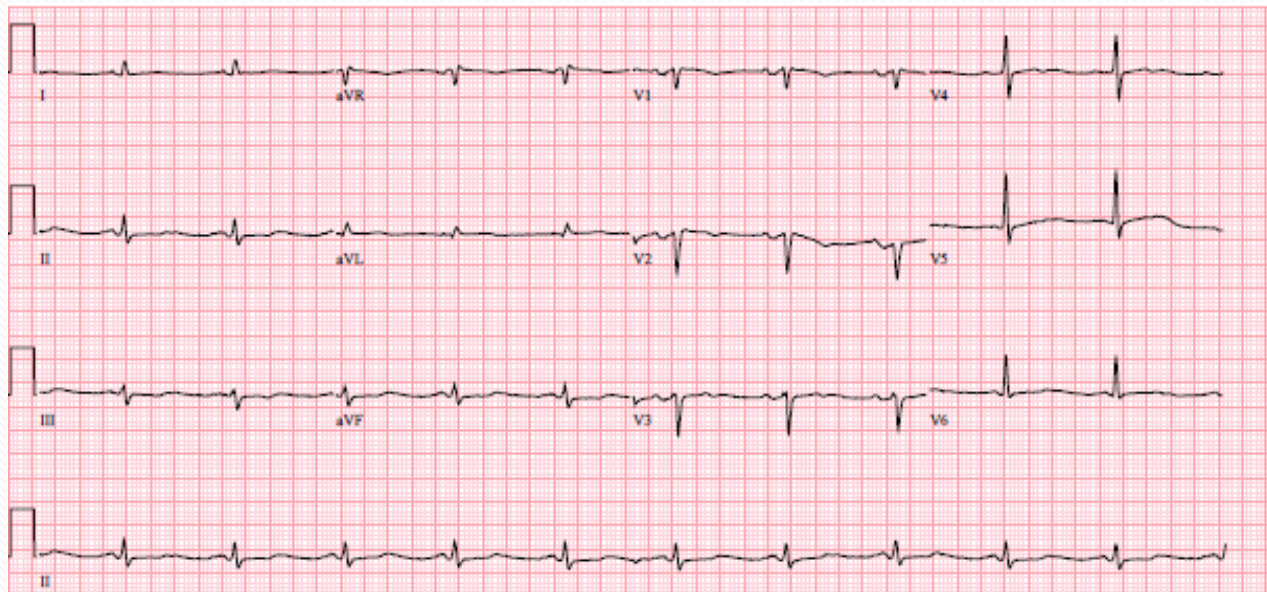
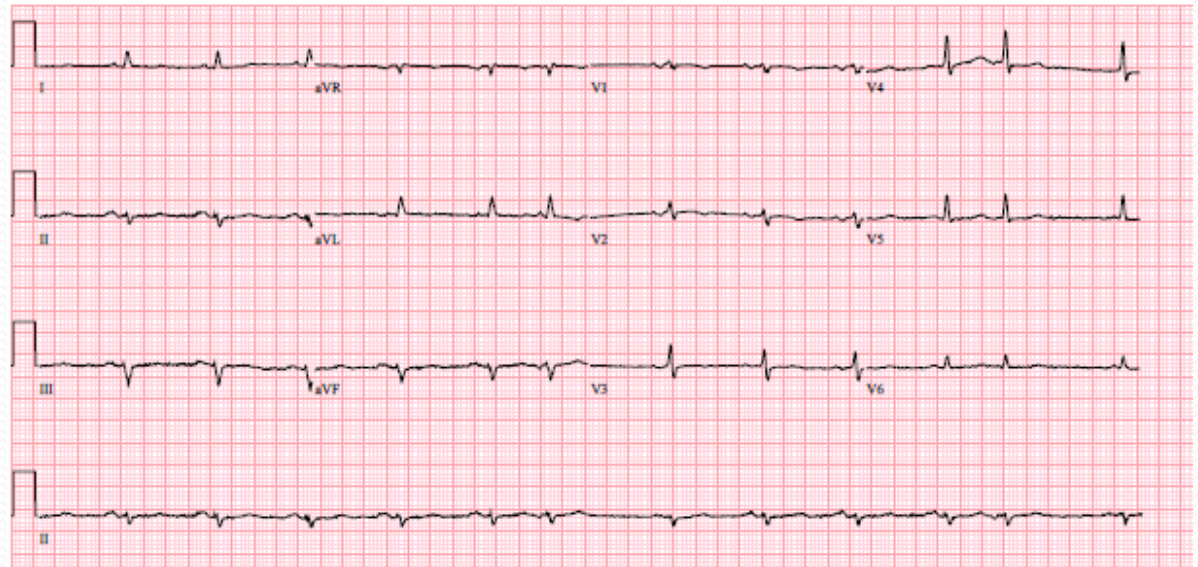




Post pericardiectomy



Before surgery



After surgery



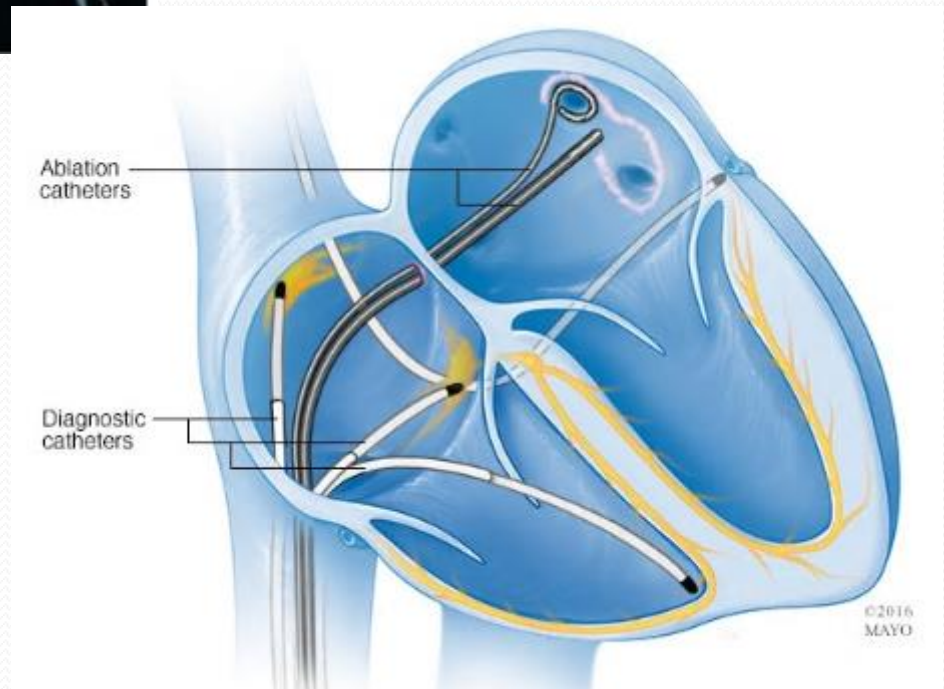
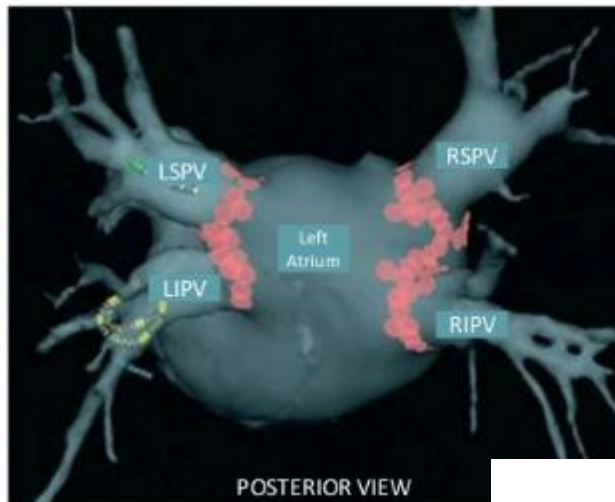
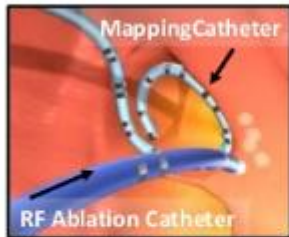
PACEMAKERS

Leadless Pacemakers



JACC 2017;69:211-35

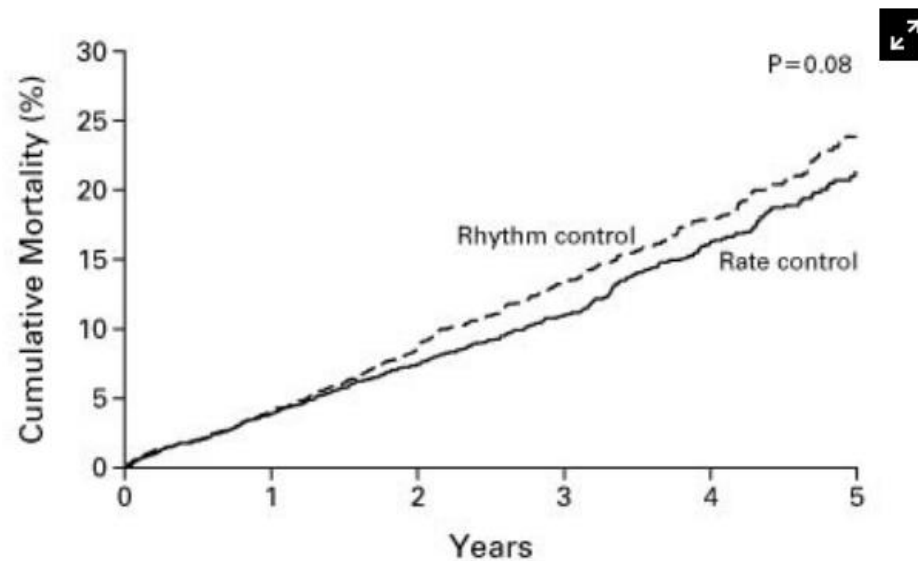
Catheter Ablation For Paroxysmal AF



A Comparison of Rate Control and Rhythm Control in Patients with Atrial Fibrillation

The Atrial Fibrillation Follow-up Investigation of Rhythm Management (AFFIRM) Investigators*

Figure 1. Cumulative Mortality from Any Cause in the Rhythm-Control Group and the Rate-Control Group.



NO. OF DEATHS		number (percent)					
Rhythm control	0	80 (4)	175 (9)	257 (13)	314 (18)	352 (24)	
Rate control	0	78 (4)	148 (7)	210 (11)	275 (16)	306 (21)	

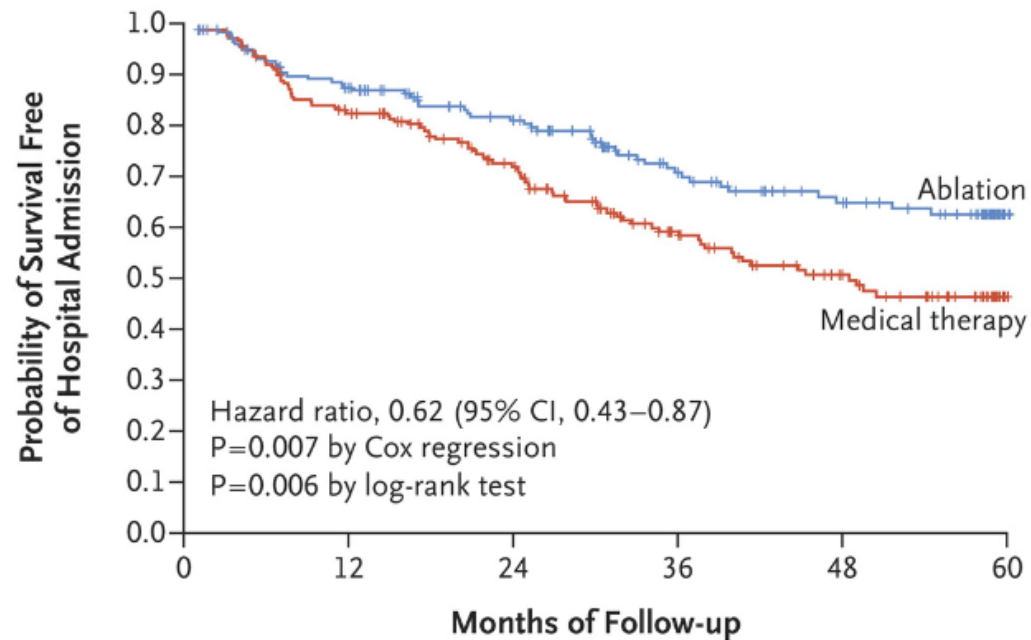
NEJM
2002
347:1825

Catheter Ablation for Atrial Fibrillation with Heart Failure

Nassir F. Marrouche, M.D., Johannes Brachmann, M.D., Dietrich Andresen, M.D., Jürgen Siebels, M.D., Lucas Boersma, M.D., Luc Jordaens, M.D., Béla Merkely, M.D., Evgeny Pokushalov, M.D., Prashanthan Sanders, M.D., Jochen Proff, B.S., Heribert Schunkert, M.D., Hildegard Christ, M.D., et al., for the CASTLE-AF Investigators*

NEJM
2018
378:417-

A Death or Hospitalization for Worsening Heart Failure



No. at Risk

Ablation	179	141	114	76	58	22
Medical therapy	184	145	111	70	48	12

Ventricular tachycardia

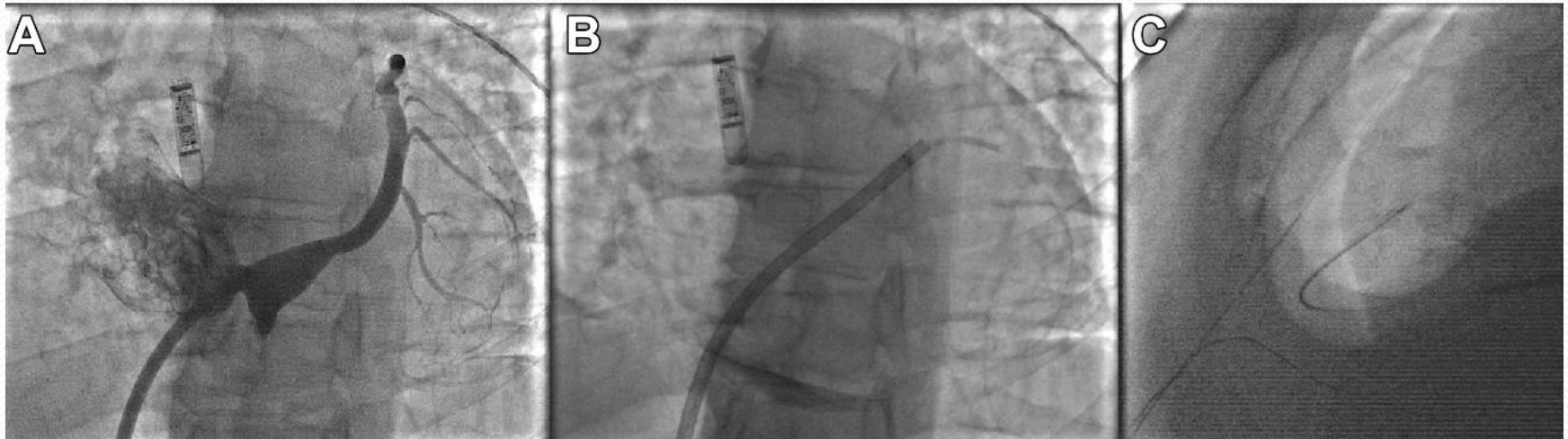
- New options to drug therapy
- Catheter ablation
- Epicardial and endocardial ablation



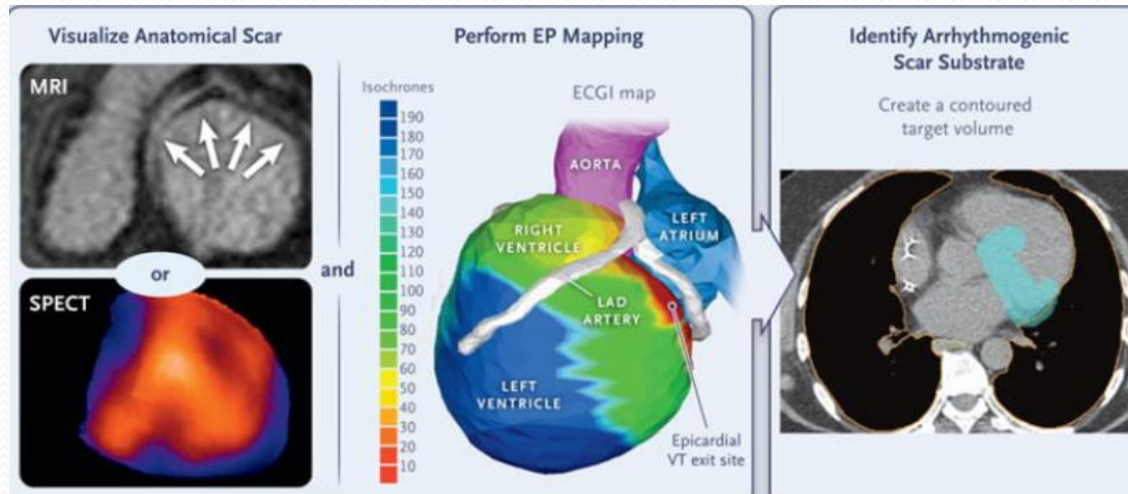
New Research Paper

Coronary Vein Exit and Carbon Dioxide Insufflation to Facilitate Subxiphoid Epicardial Access for Ventricular Mapping and Ablation: First Experience

John Silberbauer MA, MD(Res)^{a, *}, John Gomes PhD^{a, *}, Sean O'Nunain MD^{a, *}, Senthil Kirubakaran MD^{a, b, *}, David Hildick-Smith MD^{a, *}, James McCready MBBS^{a, *}



Ventricular tachycardia

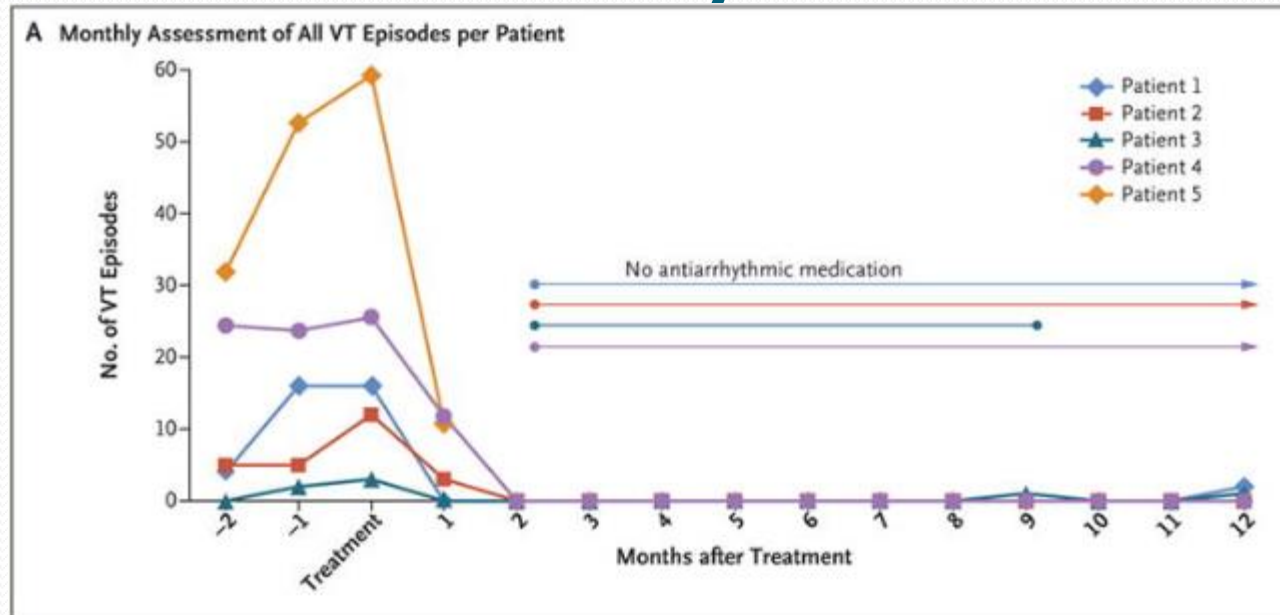


ORIGINAL ARTICLE

Noninvasive Cardiac Radiation for Ablation of Ventricular Tachycardia

Phillip S. Cuculich, M.D., Matthew R. Schill, M.D., Rojano Kashani, Ph.D., Sasa Mutic, Ph.D., Adam Lang, M.D., Daniel Cooper, M.D., Mitchell Faddis, M.D., Ph.D., Marye Gleva, M.D., Amit Noheria, M.B., B.S., Timothy W. Smith, M.D., D.Phil., Dennis Hallahan, M.D., Yoram Rudy, Ph.D., [et al.](#)

Ventricular tachycardia



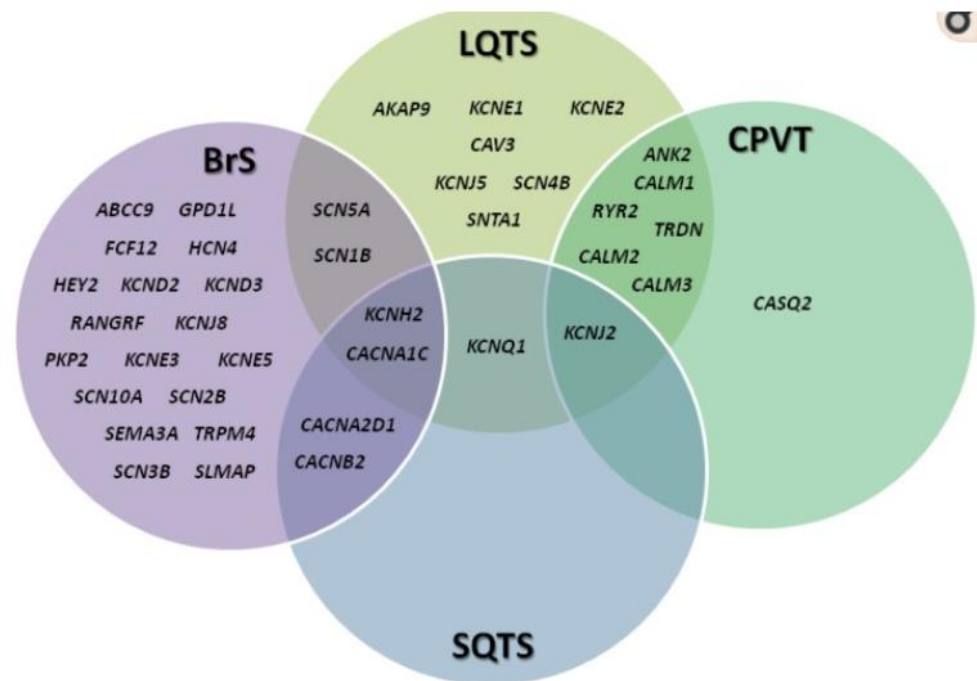
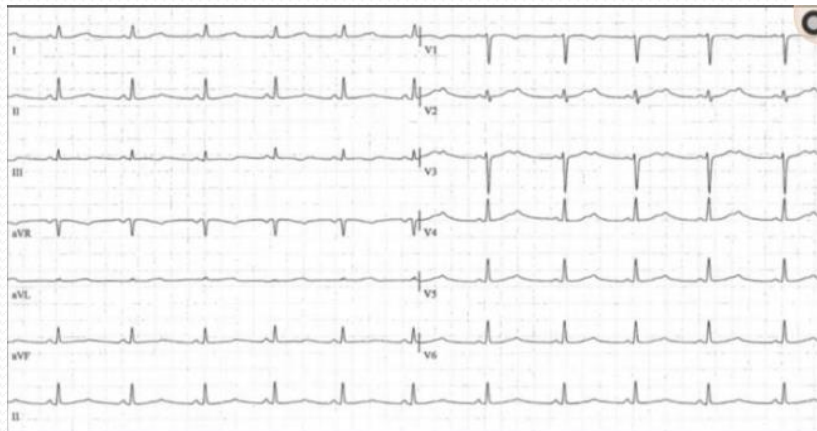
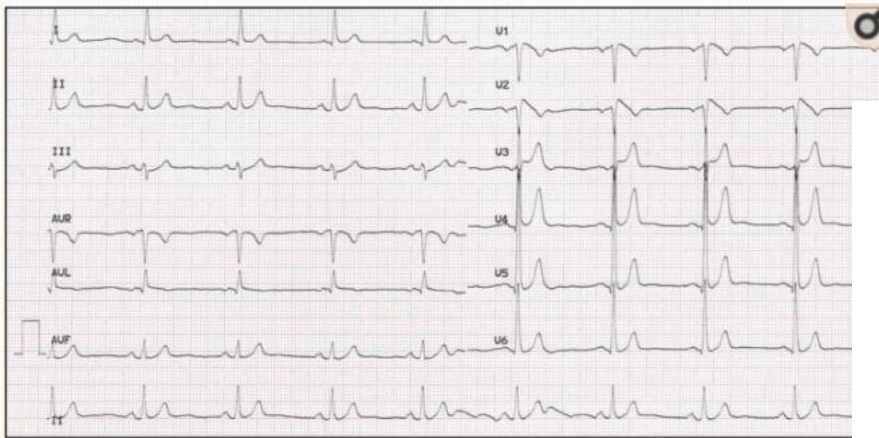
NEJM 2017;377:2325-2336

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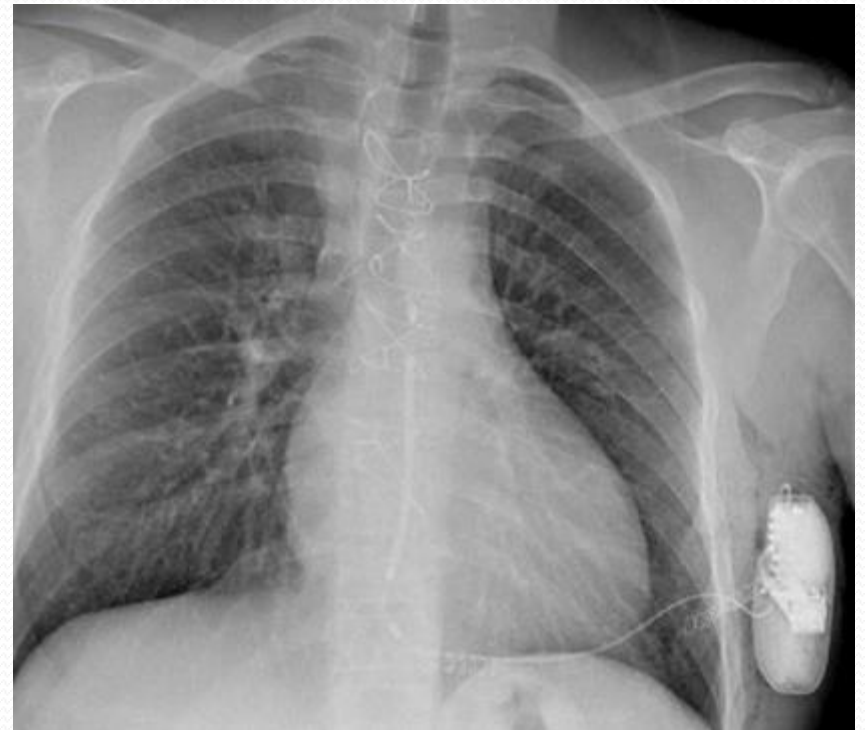
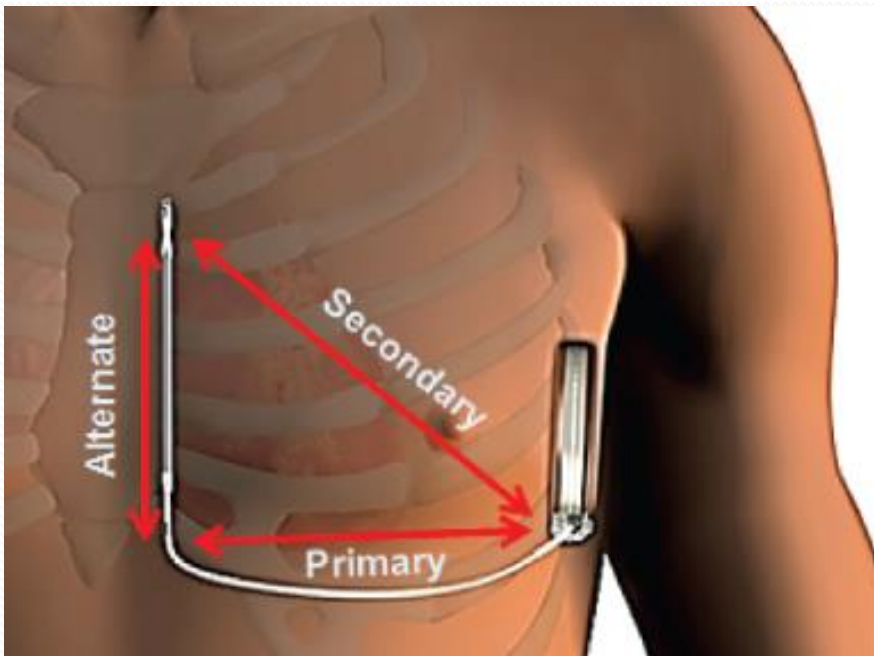
Cardiac channelopathies



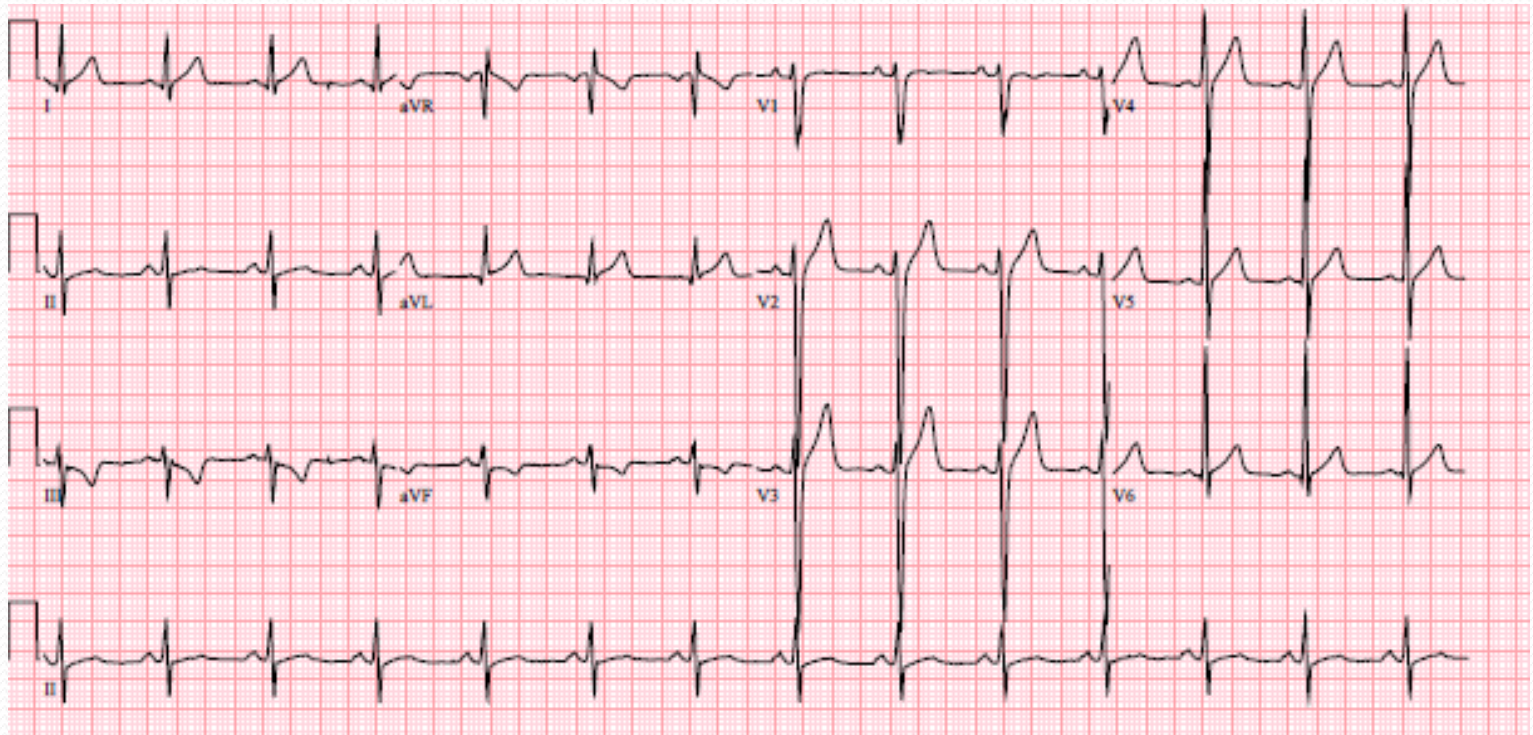
Brugada syndrome

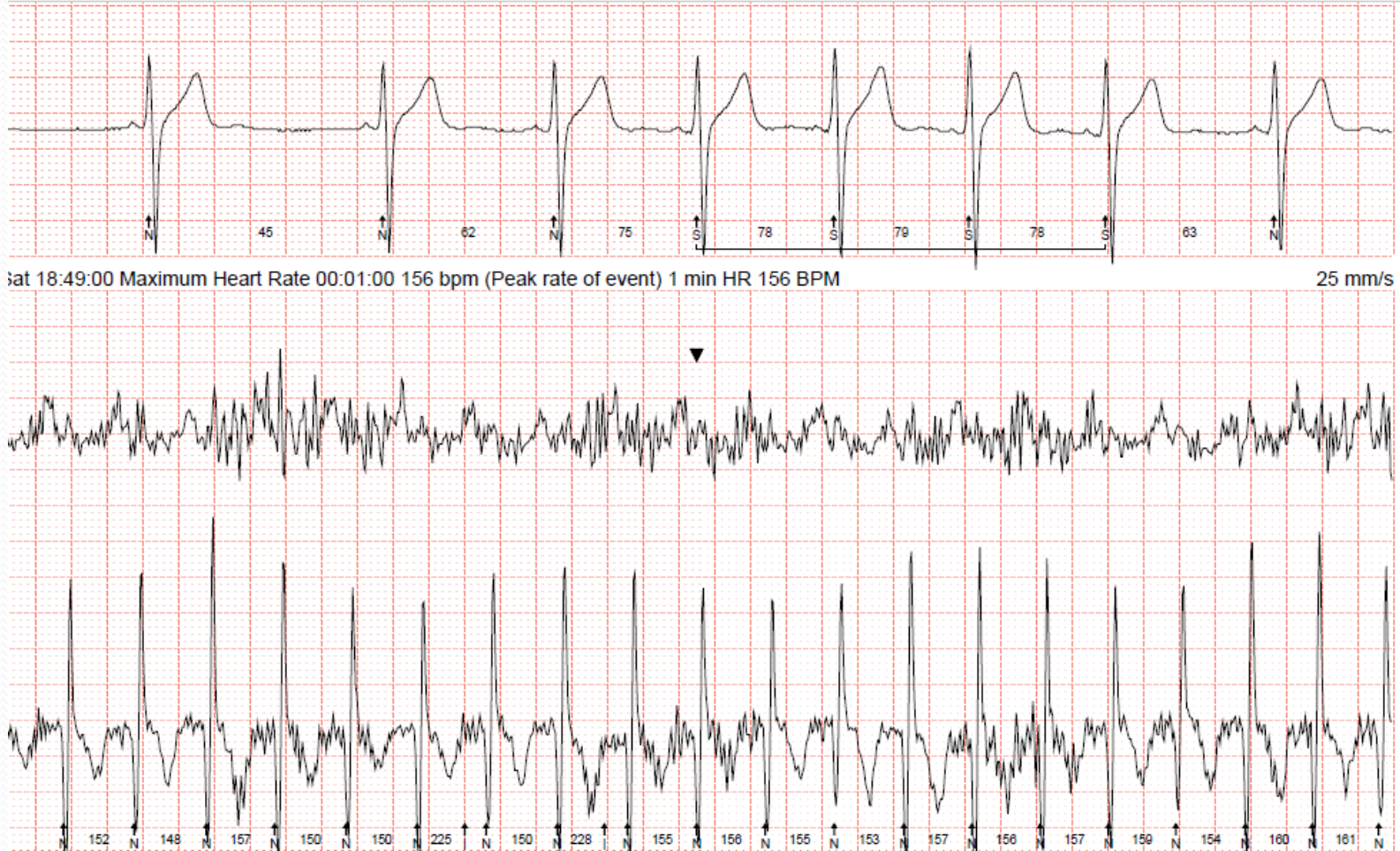
BrS is a channelopathy with an autosomal-dominant pattern of inheritance. The first genetic alteration associated with BrS was identified in the *SCN5A* gene encoding the α -subunit of the cardiac sodium channel, Nav1.5 [28]. Since then, more than 450 pathogenic variants have been identified in 24 genes encoding sodium, potassium, and calcium channels or associated proteins (*ABCC9*, *CACNA1C*, *CACNA2D1*, *CACNB2*, *FGF12*, *GPD1L*, *HCN4*, *HEY2*, *KCND2*, *KCND3*, *KCNE3*, *KCNE5*, *KCNH2*, *KCNJ8*, *PKP2*, *RANGRF*, *SCN10A*, *SCN1B*, *SCN2B*, *SCN3B*, *SCN5A*, *SEMA3A*, *SLMAP*, and *TRPM4*

Subcutaneous ICD

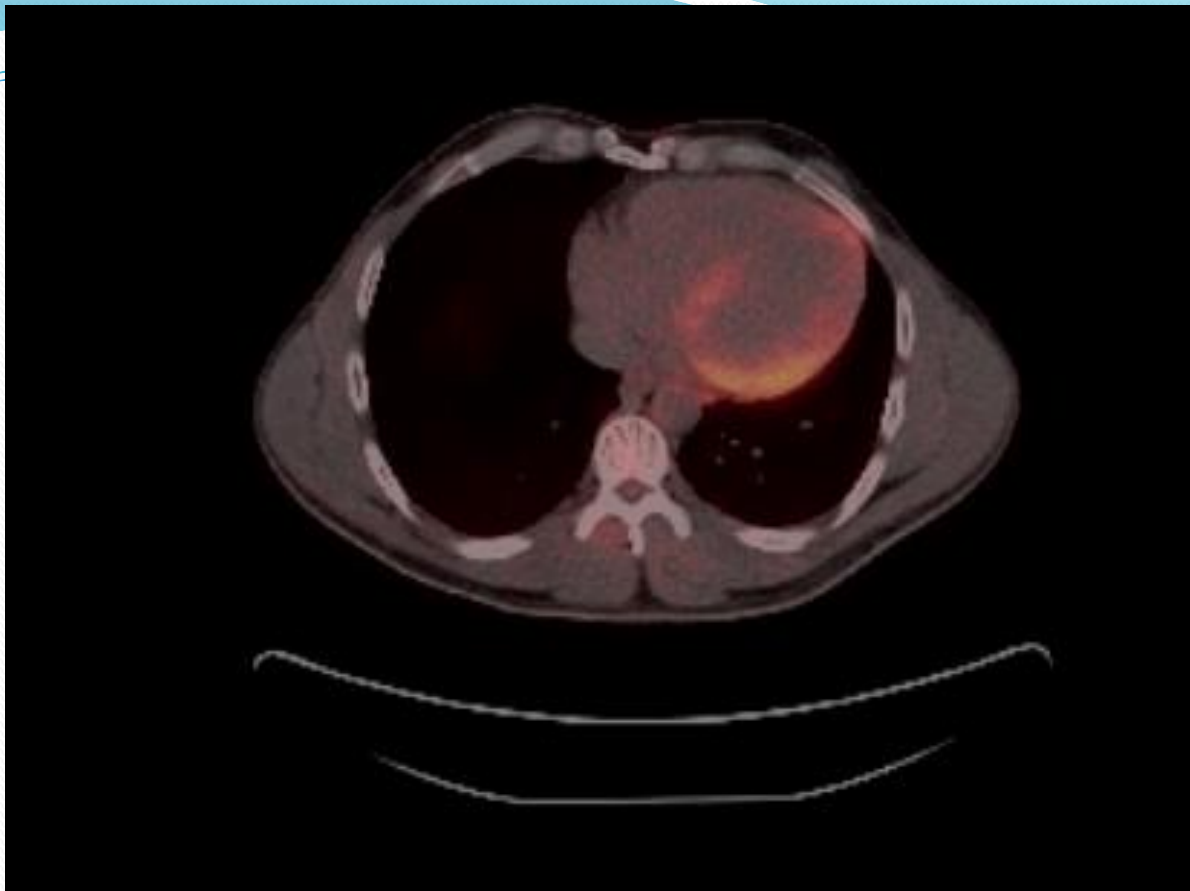


31 years – palpitations – bodybuilder on
trenbolone and testosterone.





Much worse on stopping trembolone



PET scan – cardiac
sarcoidosis

Scary future

- Smart watch will identify troponin release/platelet activation
- Emergency IRA PCI with new generation bioabsorbable scaffold
- Infusion of BM derived stem cells
- Implant of micro defibrillator
- Gene profiling will tailor
- ..leading to a utopian nightmare of elderly demented overpopulated...aargh!!