

The Investigation of Young Patients with Brain Infarcts

Dr. Mark Belham MD FRCP
Head of Echocardiography
Department of Cardiology
Cambridge University Hospital

Background

Cambridge

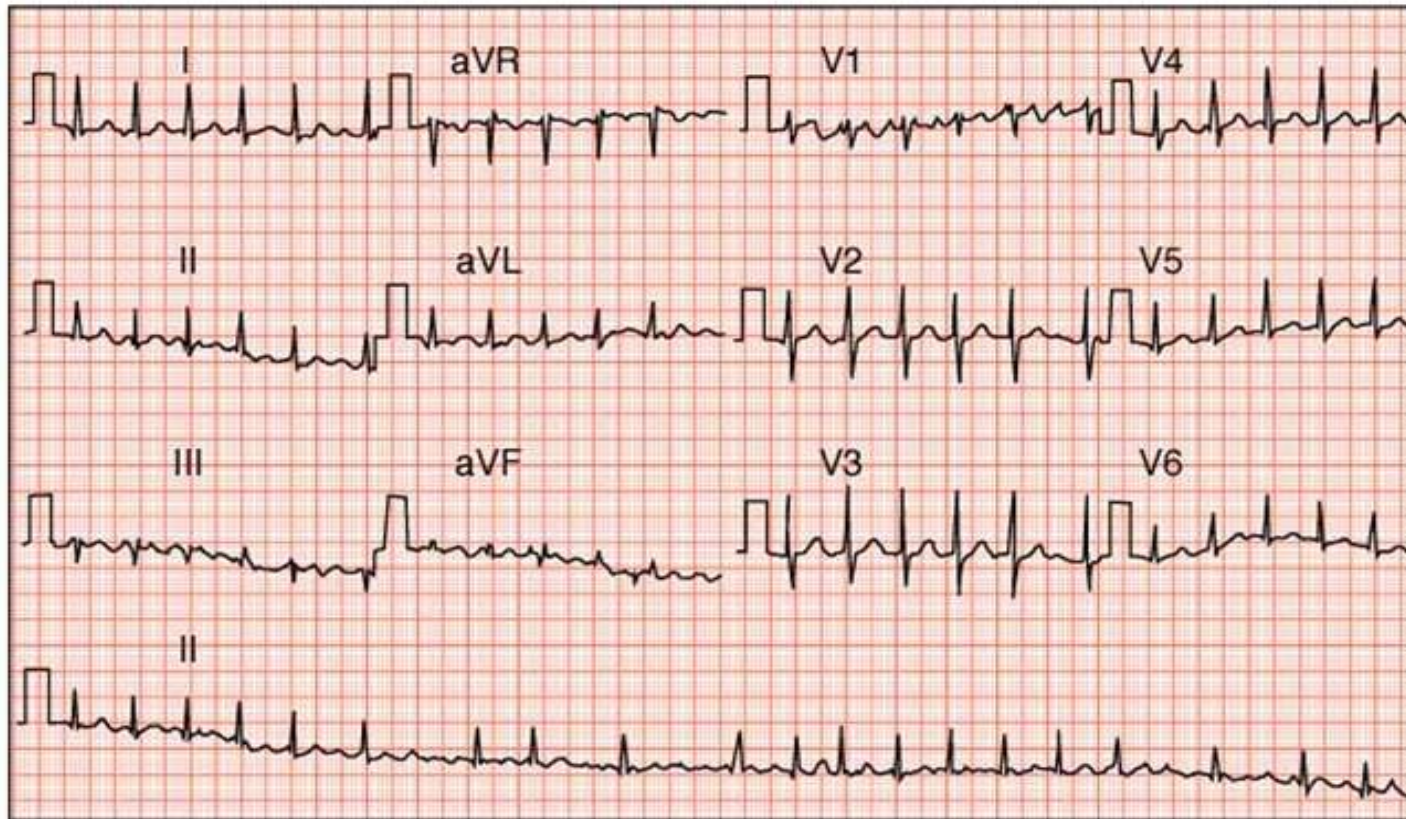
- Approximately 700 strokes/annum.
- Approximately 80% are infarcts.
- 10 - 20% of brain infarcts occur in “young” people.

Initial Investigations

- Non-Cardiac:
 - Brain MRI (CT).
 - Dissection protocol MRA (carotid Doppler).
 - Routine bloods and coagulopathies screen.
- Cardiac:
 - 12 lead ECG.
 - Transthoracic Echocardiogram.

12 lead ECG

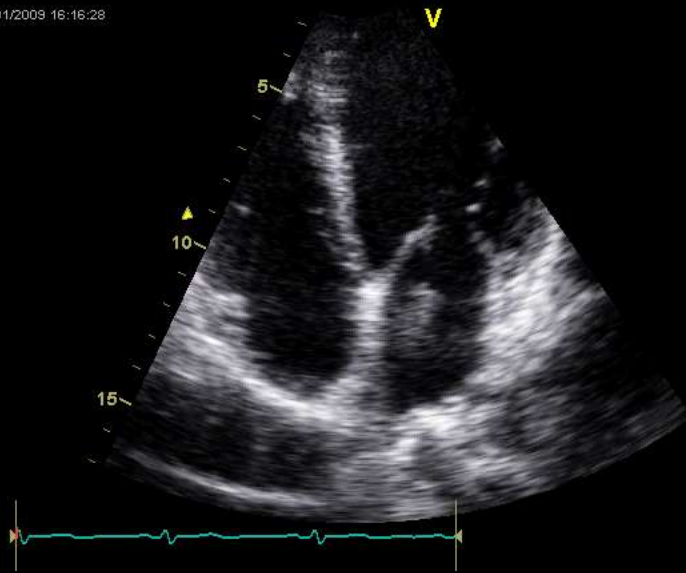
Atrial Arrhythmias



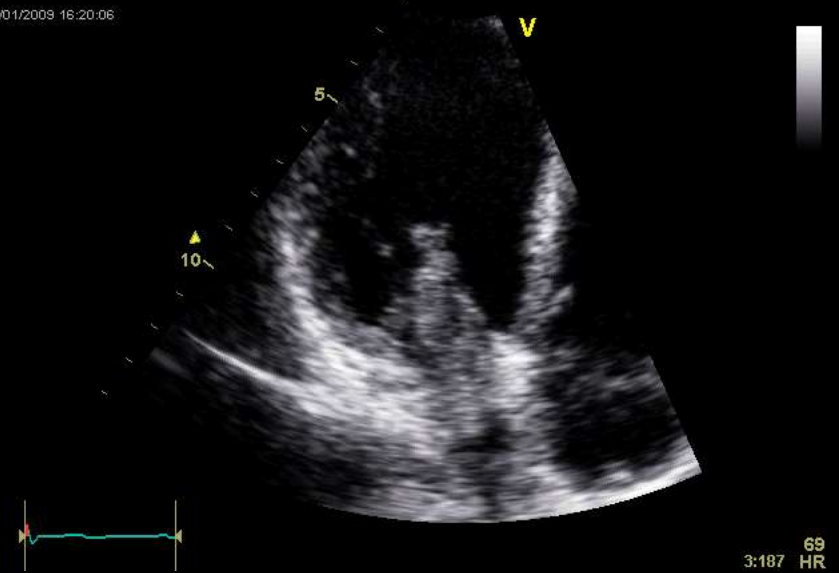
Transthoracic Echocardiography

Left Heart Masses

07/01/2009 16:16:28



07/01/2009 16:20:06

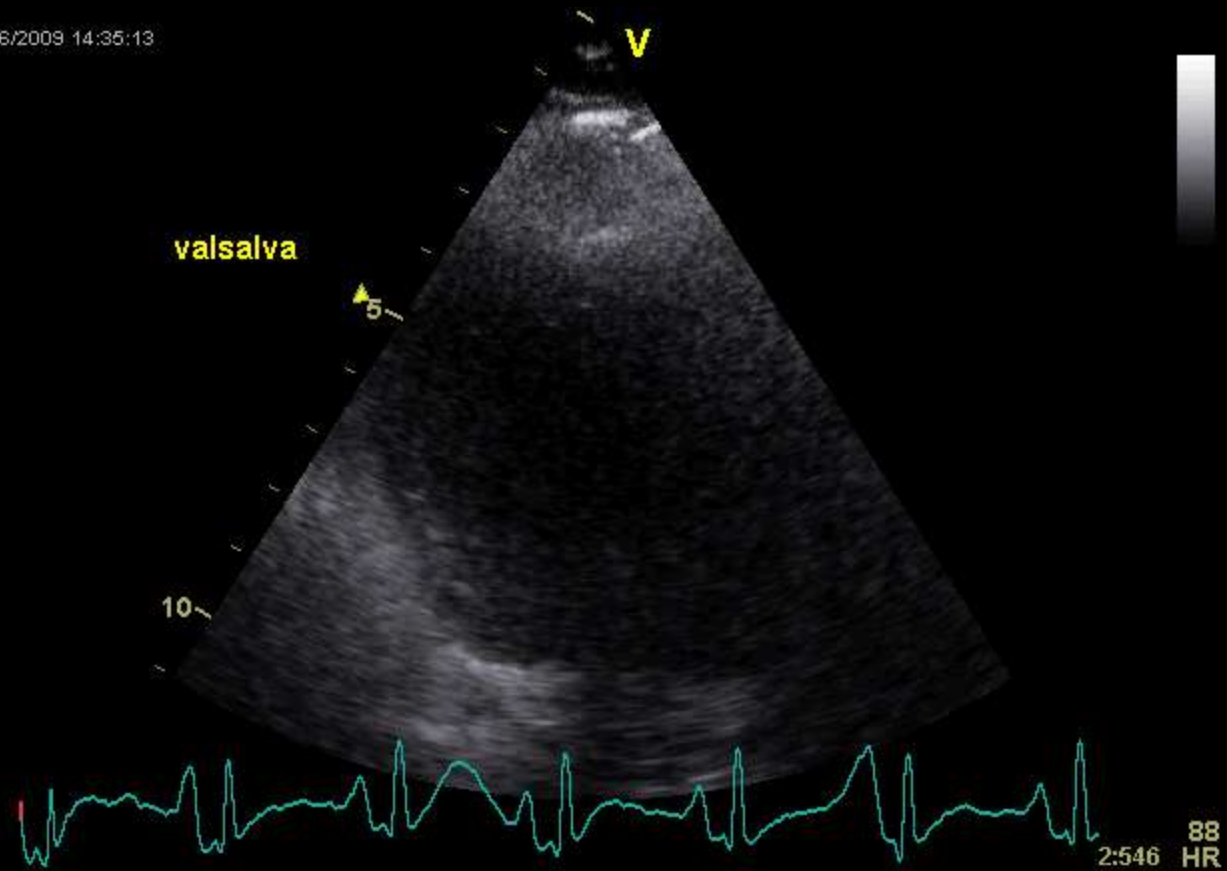


Advanced Cardiac Investigations

- After initial investigations no cause is found in up to 50% of these patients and their strokes are defined as “Cryptogenic”.
- These individuals undergo:
 - Transthoracic bubble echocardiogram.
 - Transoesophageal echocardiogram.
 - Rhythm monitoring.

Transthoracic Bubble Echocardiography

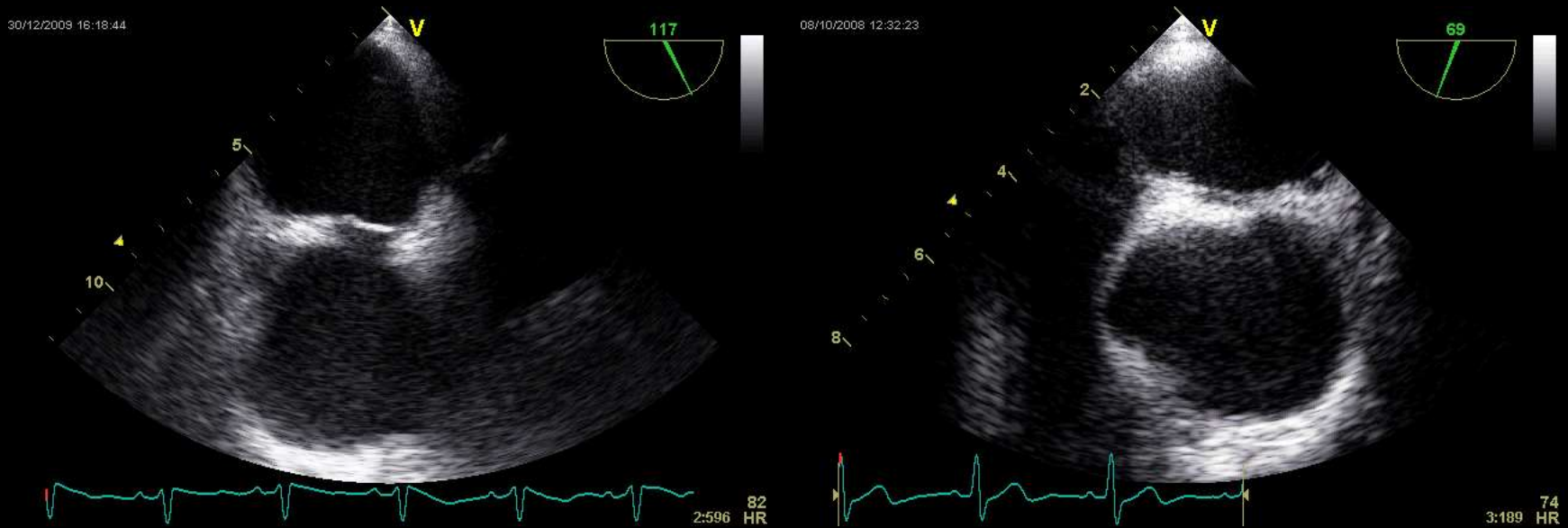
01/06/2009 14:35:13



Right to left shunt found in 75%
of patients

Transoesophageal Echocardiography

Inter-Atrial Septum

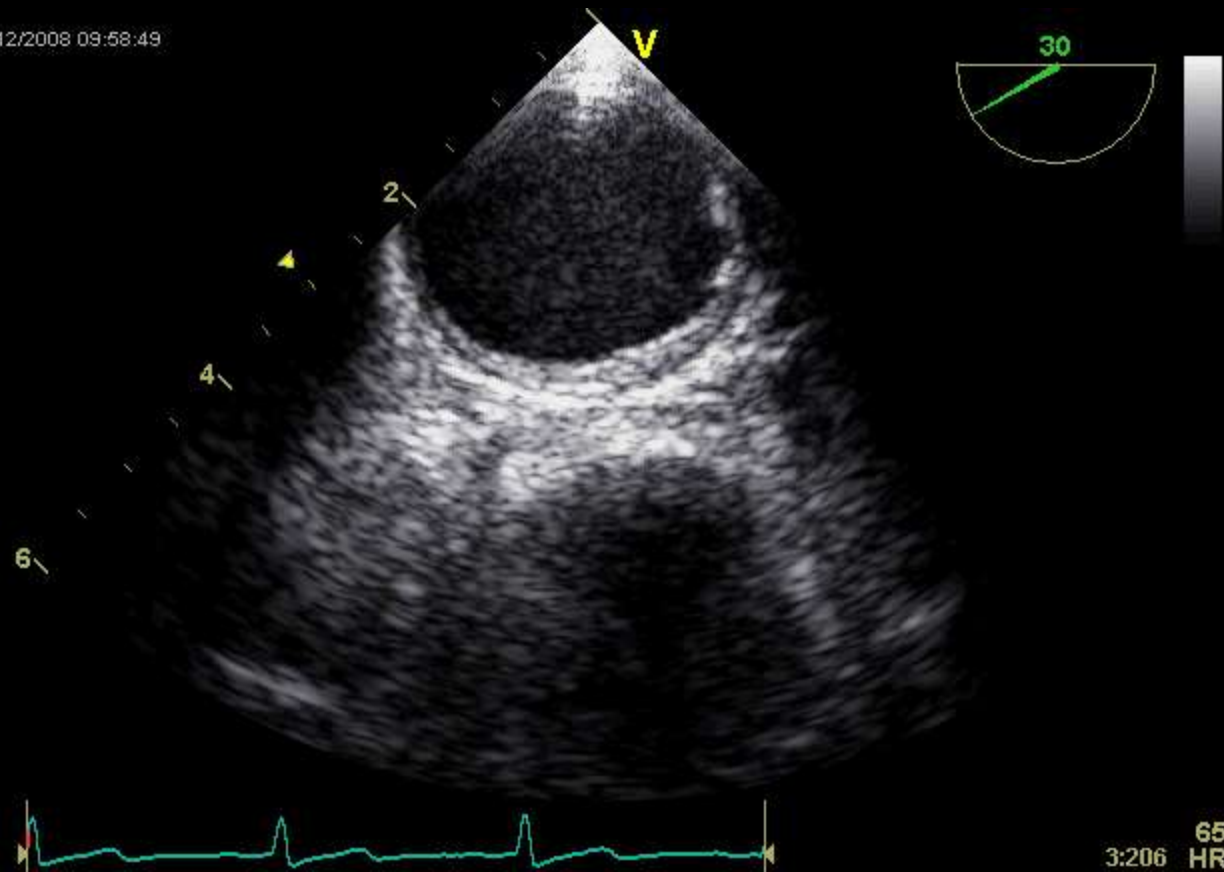


PFO found in 75% of patients

ASA found in 22% of patients

Aorta

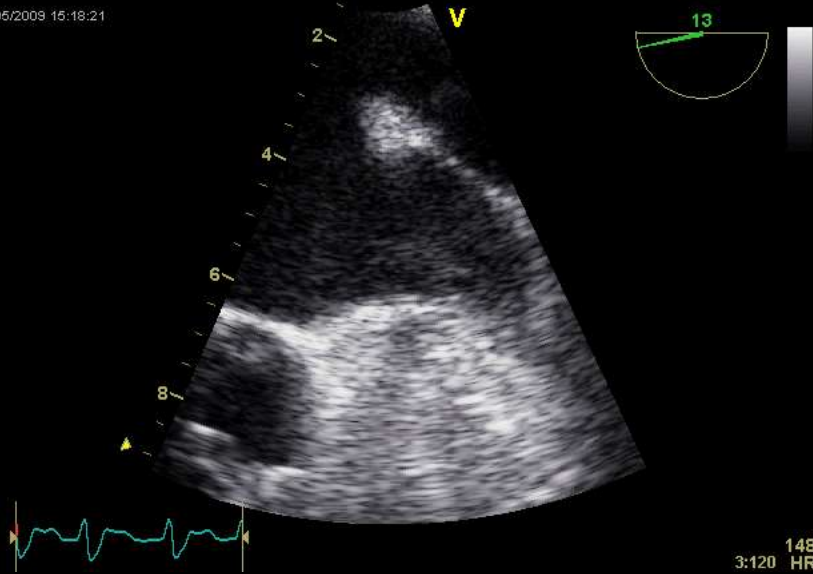
03/12/2008 09:58:49



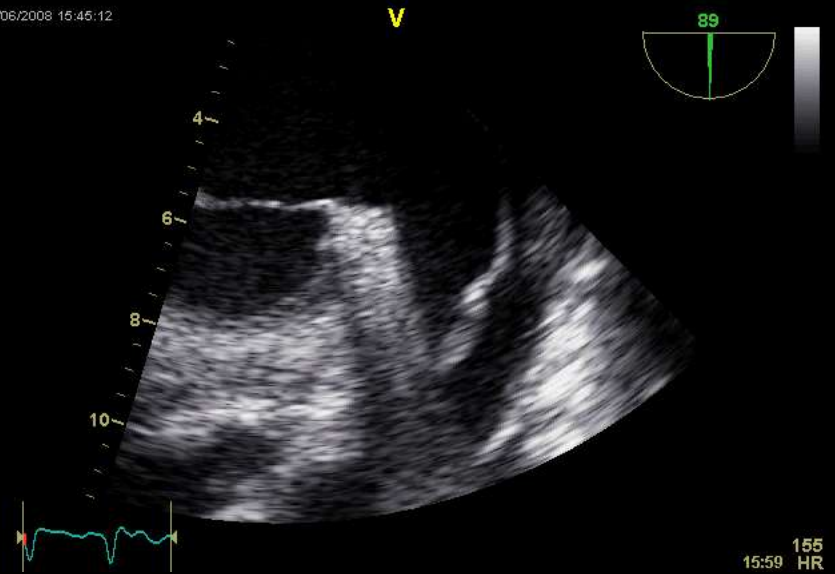
AAA found in 6% of patients

Left Atrial Appendage

18/05/2009 15:18:21



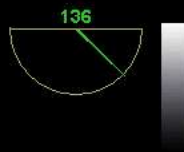
13/06/2008 15:45:12



LAA thrombus/dense SEC
found in < 1% of patients

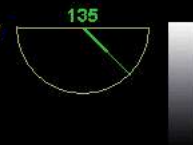
Other Areas (I)

14/01/2009 14:52:25



79:120 71 HR

14/01/2009 14:49:34

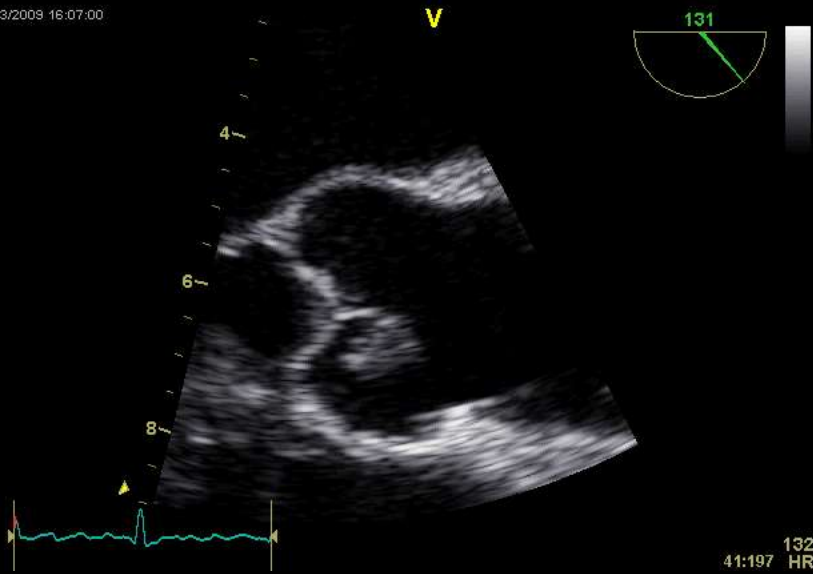


152:231 67 HR

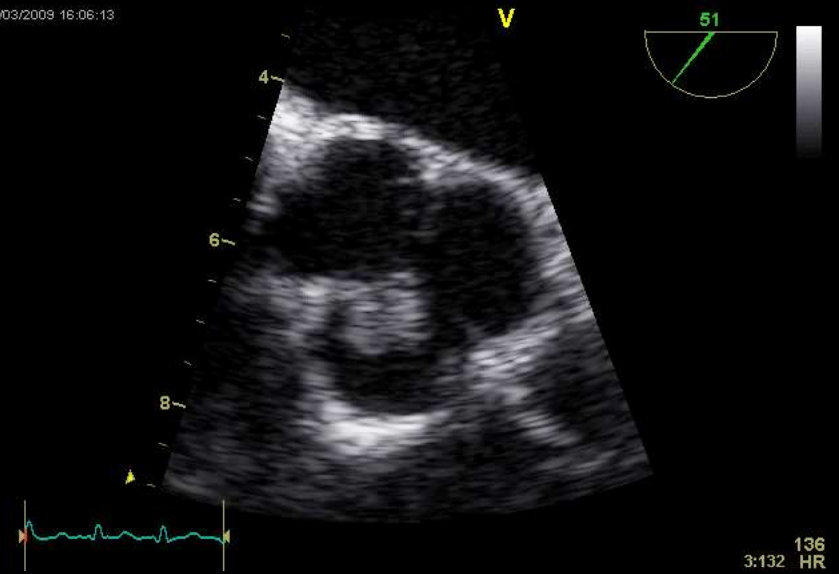
Mitral valve abnormalities
found in < 1% of patients

Other Areas (II)

25/03/2009 16:07:00



25/03/2009 16:06:13



Aortic valve abnormalities
found in < 1% of patients

Cardiac Rhythm Monitoring

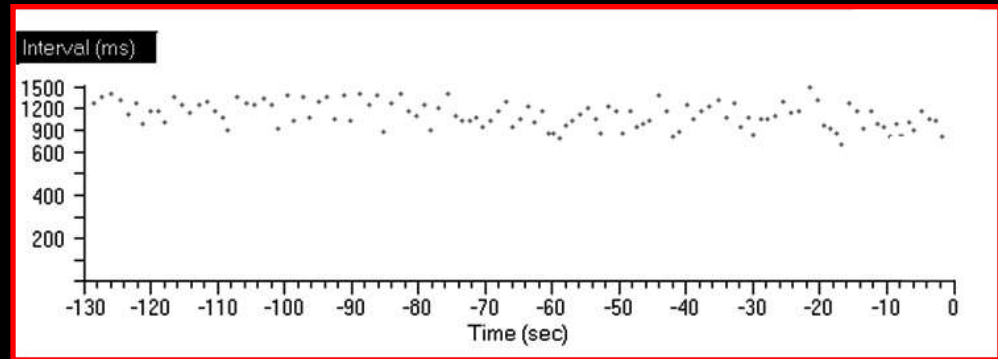
Non-Invasive Monitoring (I)

- All patients:
 - Continual ECG monitoring for at least the 1st 24 hours after admission with brain infarct.
 - 24 – 72 hours ambulatory ECG recording (in- or out- patient).

Non-Invasive Monitoring (II)

- Cambridge experience:
 - Very low rate of AF detection.
 - Occasional “incidental” detection of AF during other investigations.
- Contemporary literature:
 - 3-5% cases detected with 24^{hrs} of monitoring.
 - Longer monitoring periods increase diagnostic yield.

Implantable Loop Recorders (I)



Implantable Loop Recorders (II)

- 1st ILR with dedicated AF detection software implanted August 2010.
- Between August 2010 and September 2011 we have implanted 40 LR.
- 29 patients with at least 50 days monitoring have been analysed

Implantable Loop Recorders (III)

- Twenty nine patients:
 - 18 male and 11 female patients.
 - 16 – 70 years (median 55 [IQR 43-65]).
- AF detected in 8 patients (27.6%).

Implantable Loop Recorders (IV)

- Time to AF detection:
 - Median time elapsed was 41 days.
 - Range 1 – 118 days.
- Predictors for the occurrence of AF:
 - Age.
 - CHA₂DS₂VASc score.
 - Inter-atrial block.
 - APB frequency.
 - LA volume.

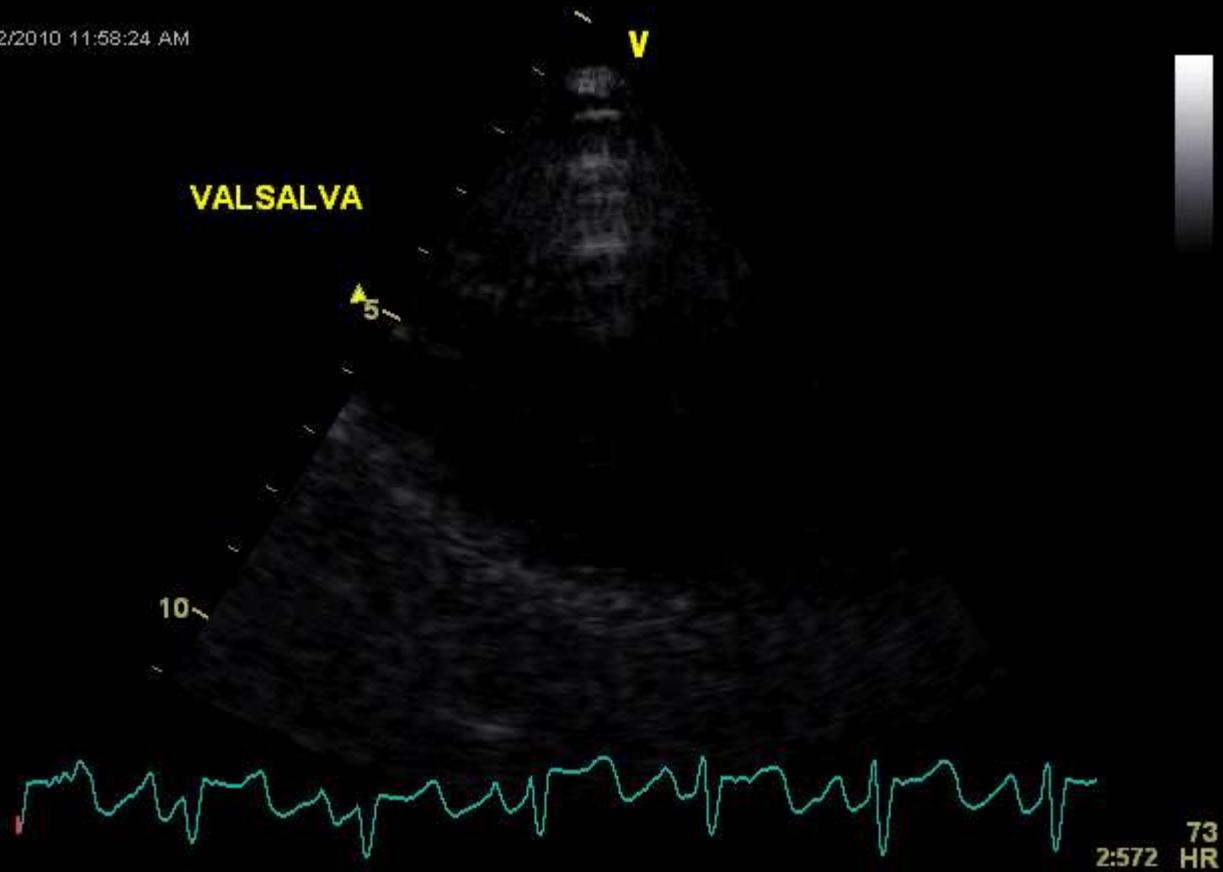
Case Study

Case 1: Mrs AC

- 54 year old female.
- Migraine (+aura). No other PMH.
- HRT. No other medication.
- Smoker. No other vascular risk factors.
- **Admitted with left MCA infarct.**
- Examination normal.
- Routine bloods, ECG and TTE normal.

Bubble Echocardiography

21/12/2010 11:58:24 AM



TOE: Atrial Septum

21/12/2010 02:03:18 PM



21/12/2010 02:05:47 PM



37:106 103 HR

61:91 124 HR

Rhythm Monitoring

- In patient telemetry:
 - Sinus rhythm throughout.
- Out patient 24 hour tape:
 - Sinus rhythm throughout.
- ILR implanted:
 - AF detected 4 months post implantation.

Case 2: Mr DB

- 48 year old male.
- Migraine (+aura). No other PMH.
- No medication.
- Non-smoker/no vascular risk factors.
- **Admitted with right PCA/MCA infarct.**
- Examination normal.
- Routine bloods, ECG and TTE normal

Advanced Echocardiography

- Bubble echocardiography:
 - Large resting shunt.
 - Complete LVO with valsalva.
- TOE:
 - Fenestrated PFO. No ASA
 - Otherwise normal.

Rhythm Monitoring

- In patient telemetry:
 - Sinus rhythm throughout.
- Out patient 24 hour tape:
 - Sinus rhythm throughout.
- ILR implanted:
 - AF detected 5 days post implantation.

~~Conclusions~~

Questions?

- **How common is AF in “cryptogenic” stroke patients?**
- **How can we target the implantation of loop recorders in order to optimise resources?**
- ***(What is the connection between atrial septal abnormalities and AF?)***

THE END

Any Questions (or Answers)?