

Reducing device-related complications

A physiologists guide!

Stuart Allen

The Manchester Heart Centre

How is device and lead choice sometimes made?

- Which programmer/ PSA is in the lab!
- Single device company procurement
- Stock levels
- Medical industry implant support
- Preference to use a particular device manufacturer

How should device and lead choice be made?

- Discussion with the operator – ideally not when the patient is on the table! –
- Discussions should be at the beginning of the list or MDT is preferable
- MDT - Especially for box changes/ upgrades – different header connectors – DF1/IS1, DF4/IS4 etc, lead issues/ MR compatibility, lead revisions, advisories etc etc

What are the important decisions/
tests for a device implant to avoid
post implant complications??

Pacing/ ICD leads selection

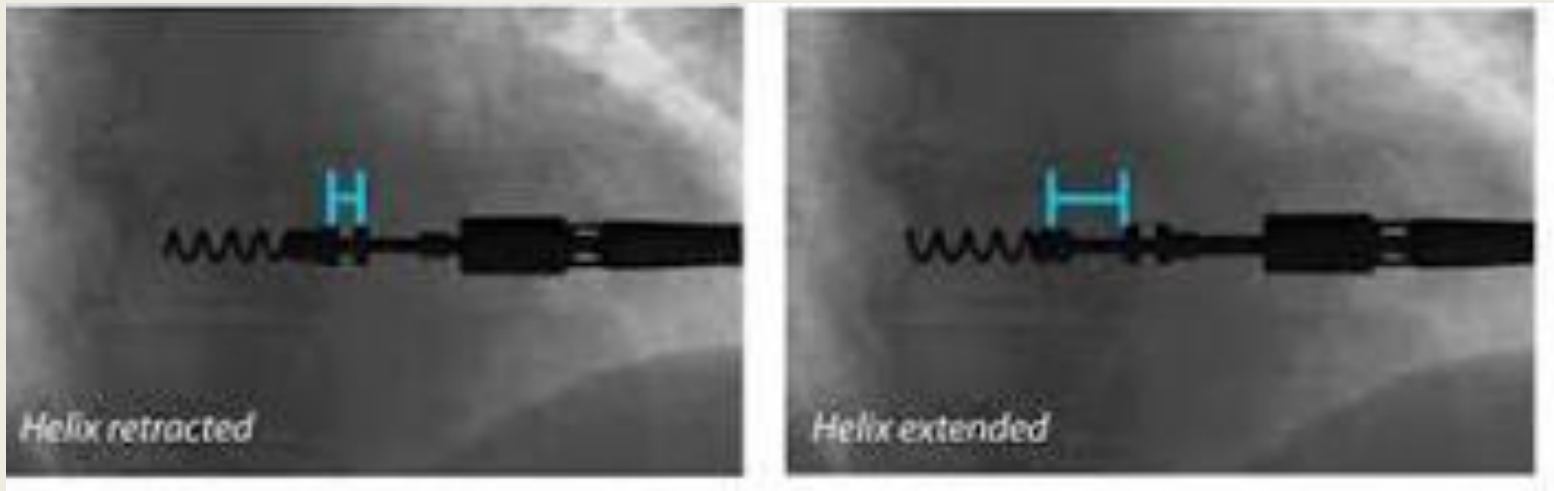
- Lead length – why use 58/60cm for the RV and 52/53cm for the RA when a 52cm for the RV and 45cm for the RA could be more appropriate?
- ICD leads – single coil vs dual coil, true bipolar vs integrated bipolar
- Active vs passive

Device selection

- AAI/ DDD vs search AV
- ICD – VR vs DR
- RR type – accelerometer vs respiratory vs CLS
- Wireless connectivity – remote follow up
- Battery longevity
- CRT algorithms – MPP, adaptive CRT

Lead implant considerations

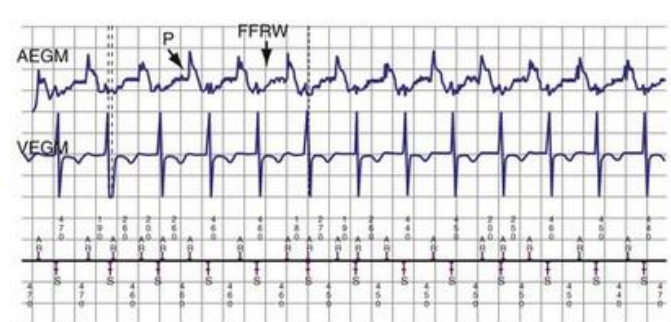
- Deployment of active fixation



- Know what the full deployment of the helix looks like under fluoroscopy
- Ensure operator screens during deployment of the helix

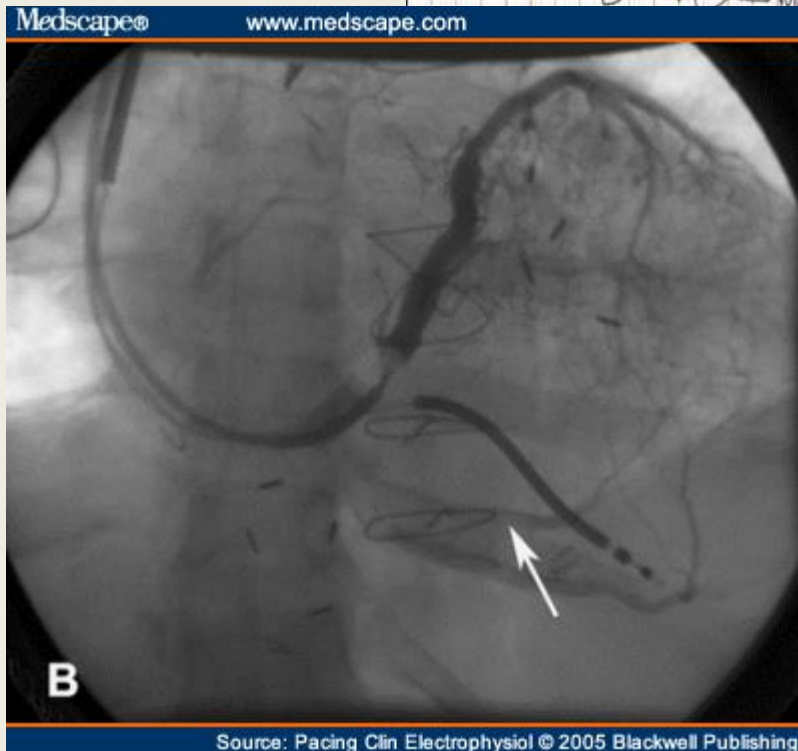
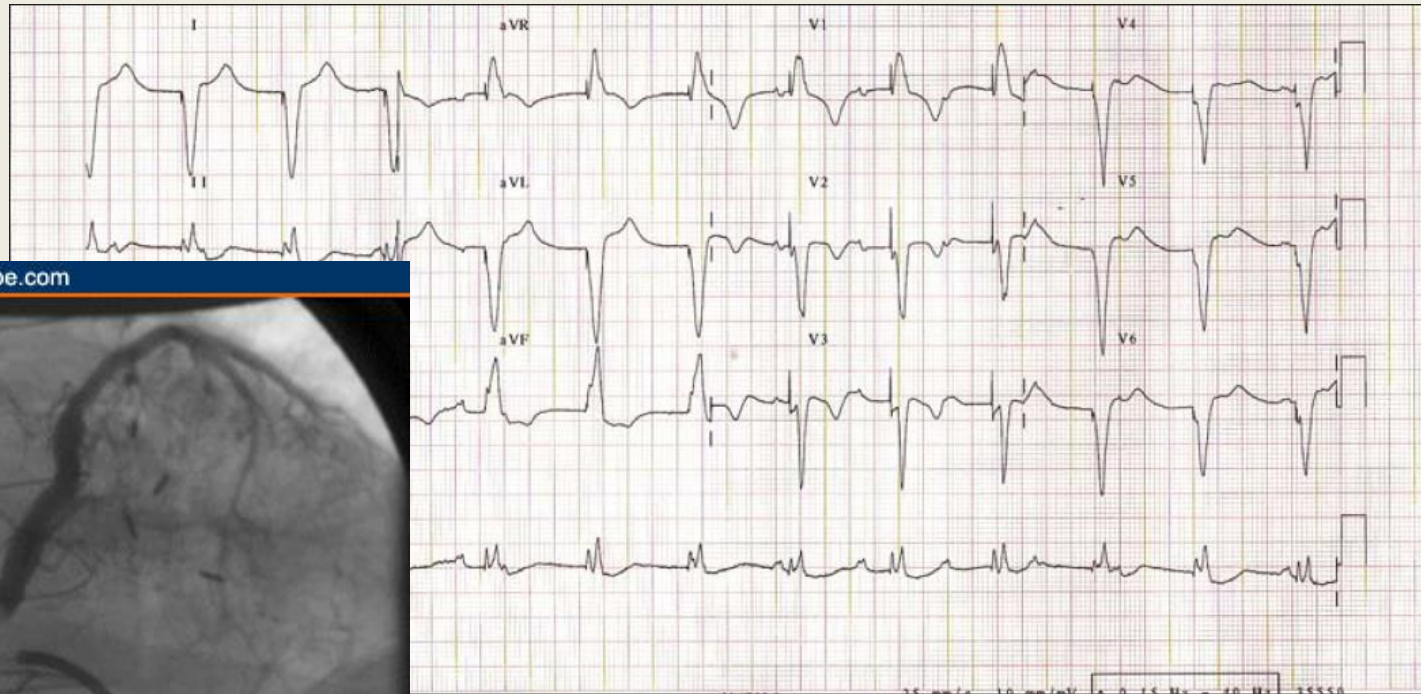
Lead position –
RAA vs RA lateral
wall

Important to avoid
FFRW

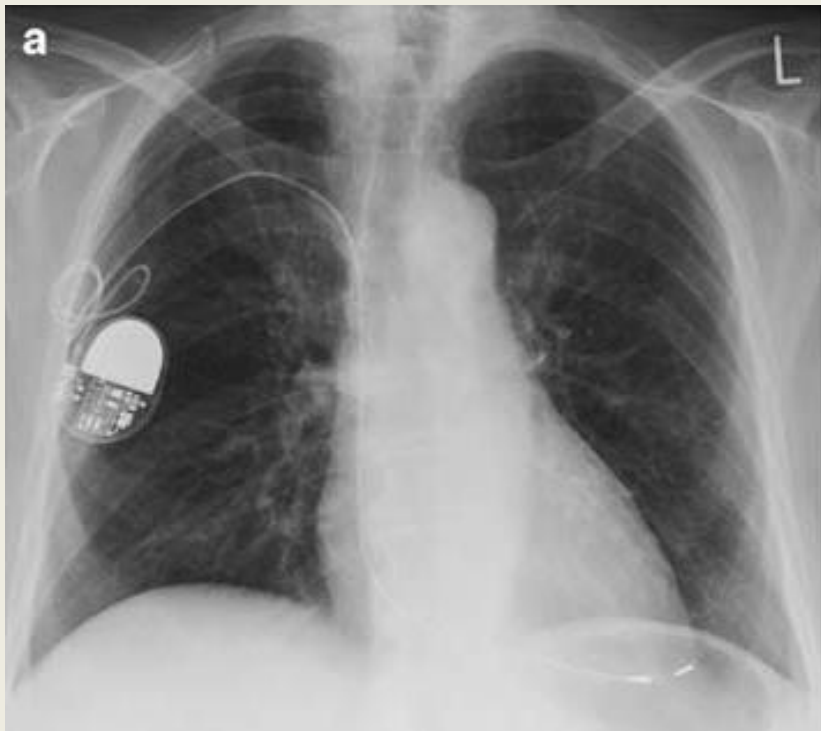


ECG in the device lab

- Always use a V1 for ALL pacemaker and ICD implants



Perforation from RV to LV



Perforation

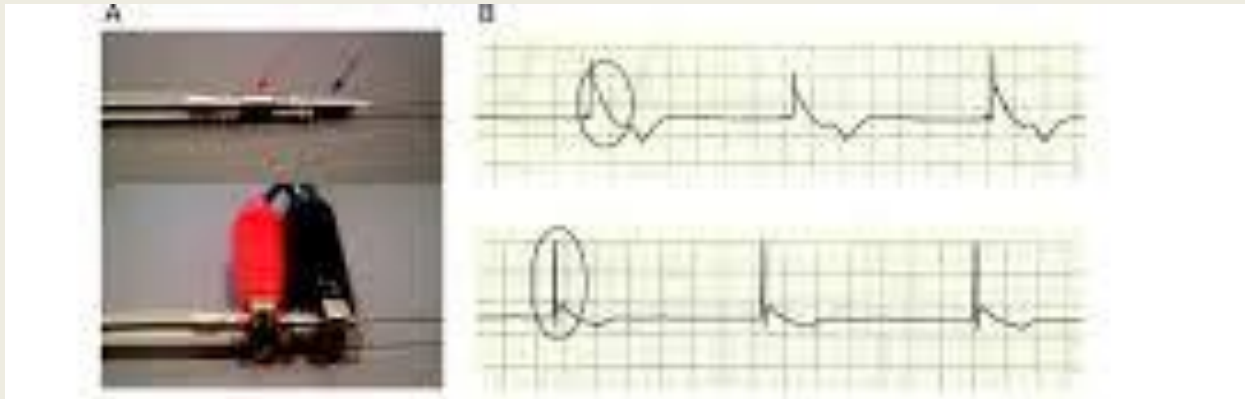


- Any lead can perforate!
- Can be difficult to visualise on X-Ray, particularly at implant
- Diaphragmatic pacing
- High Threshold
- R wave $>25\text{mv}$
- Positive T wave on V lead egm, loss of injury potential

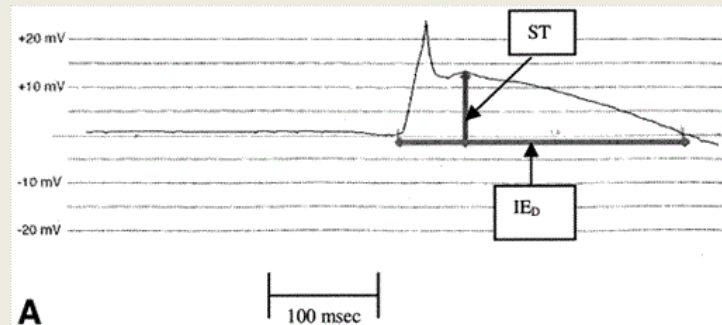


Lead implant considerations

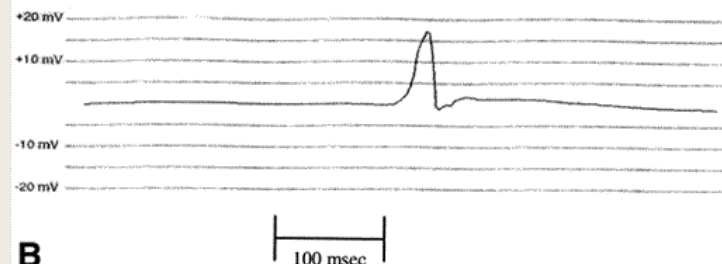
- Injury current

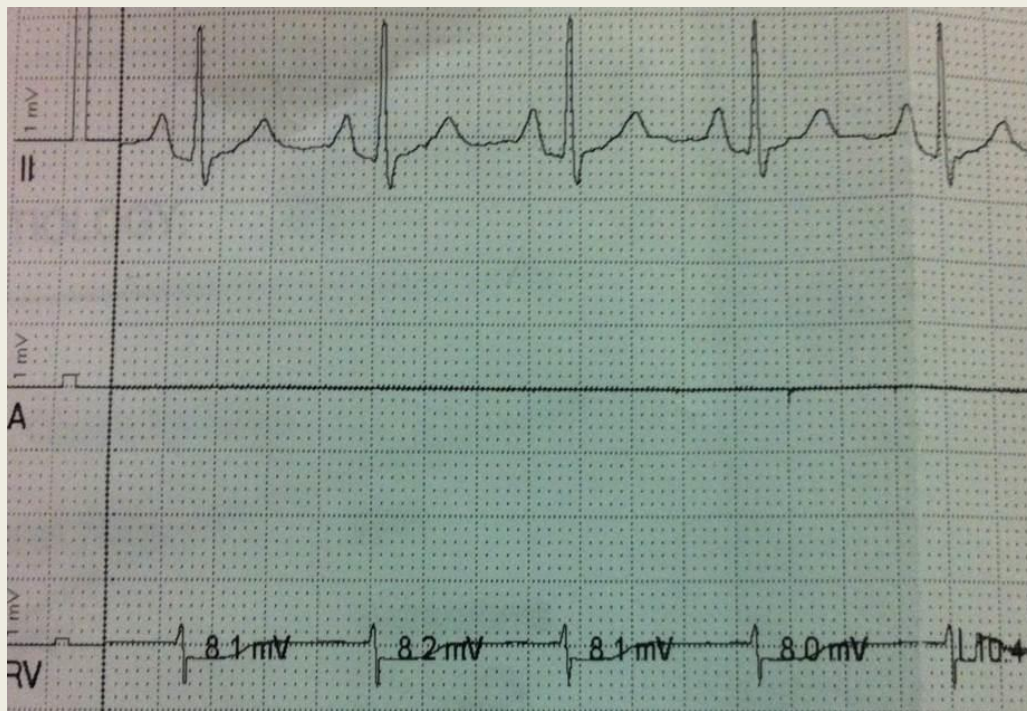


- Immediately after implant

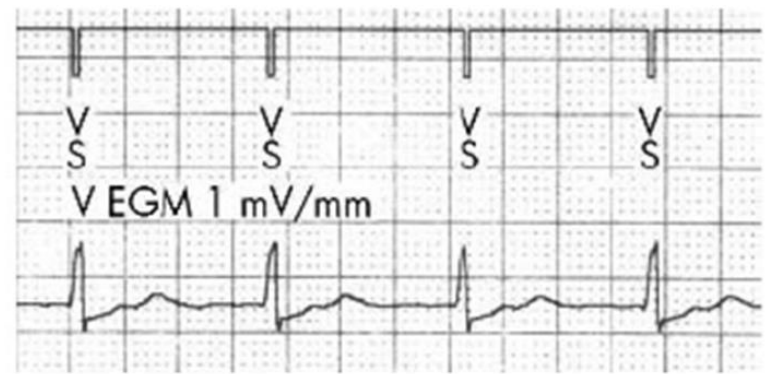


- With hours





So is this unipolar EGM showing a lead tip that is perforated???

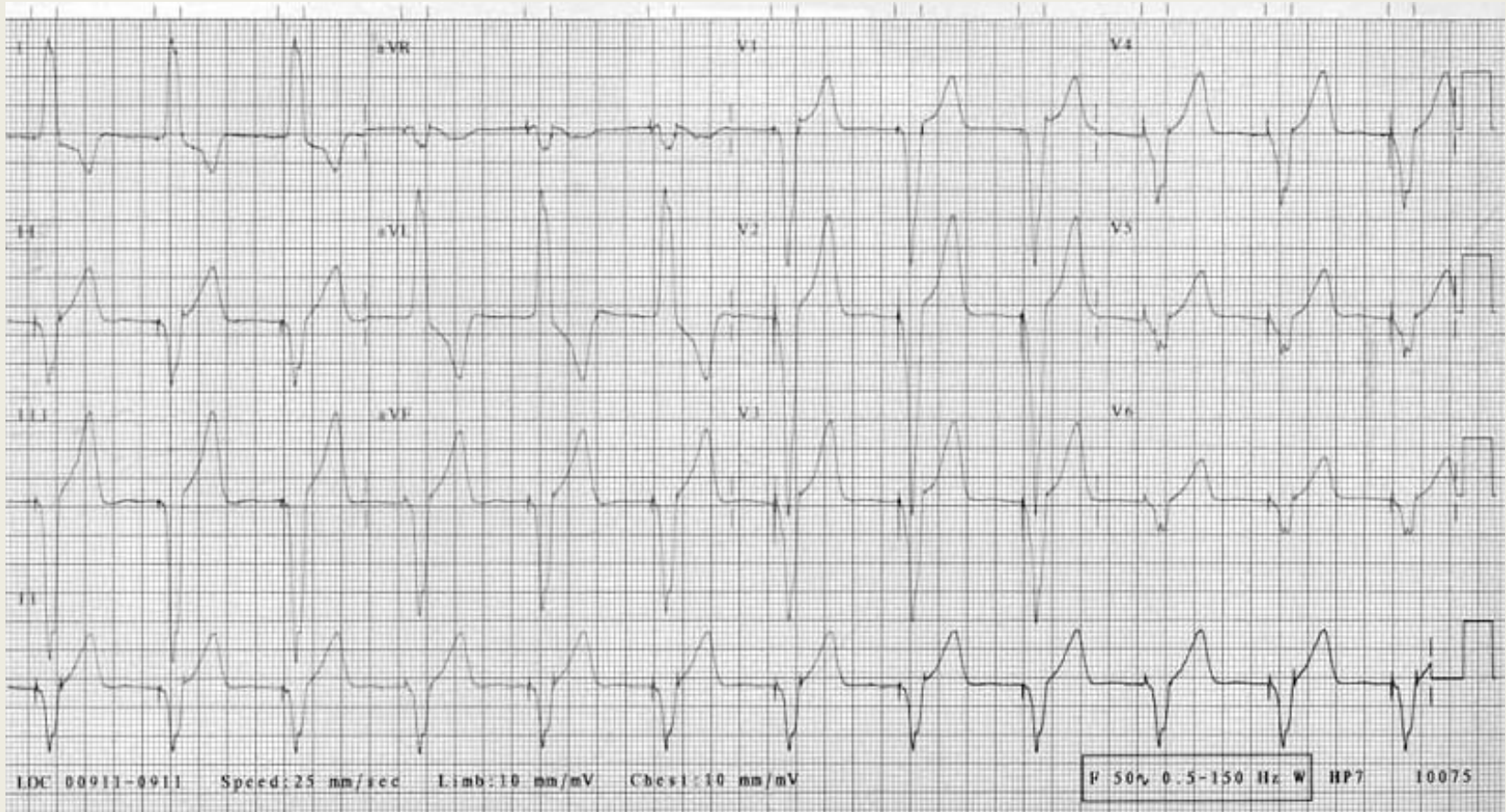


ECG in the device lab cont'd

Always use 12 lead for CRT – or at least a V1 and V6 – look for a positive R wave in V1



This should never happen – but it does!

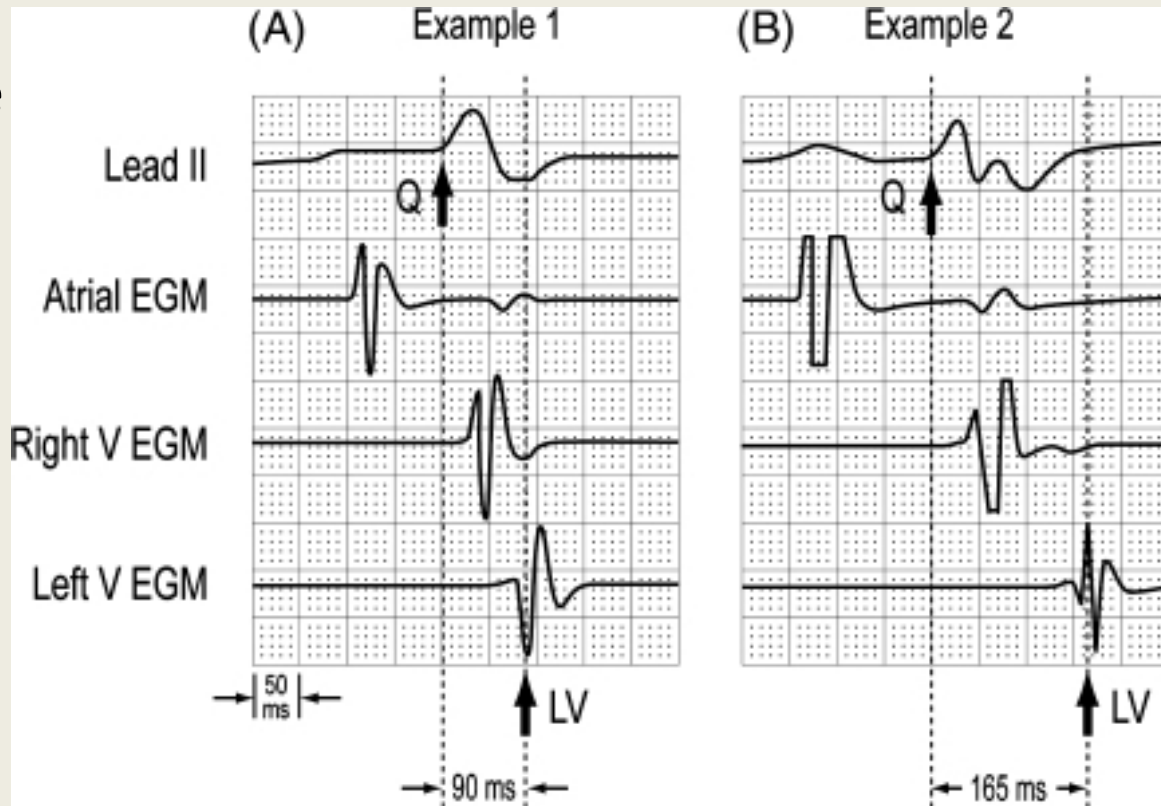


QLV

QLV is the time between the earliest QRS deflection and the steepest negative slope of the LV EGM

The ideal LV pacing vector is one with the longest QLV (balanced with the measured threshold in that vector). QLVs >95ms have shown the most benefit (sub study of the SMART AV trial)

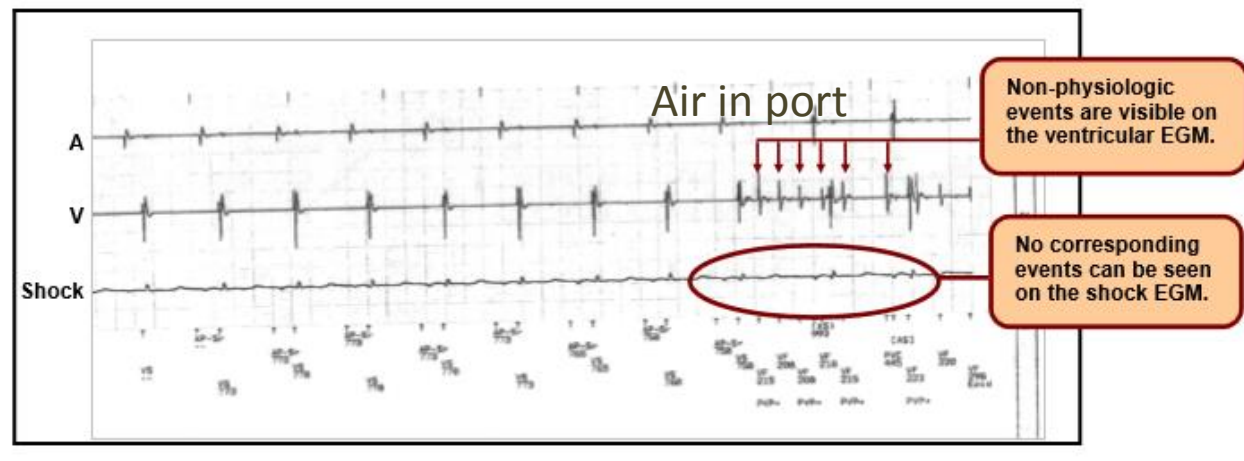
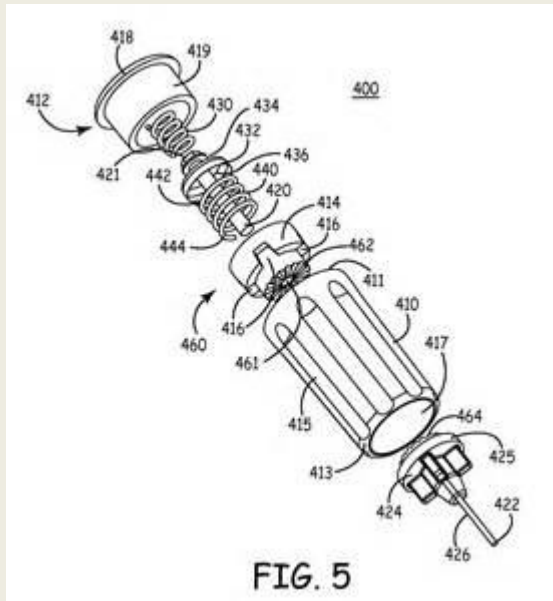
With quad leads ensure the distal and proximal poles are in an appropriate anatomical position before selecting it as part of a pacing vector.



Connecting the leads

“Burping the header” allows trapped air to escape through the grommet screw and seal

Torque Wrench
“One click is plenty”

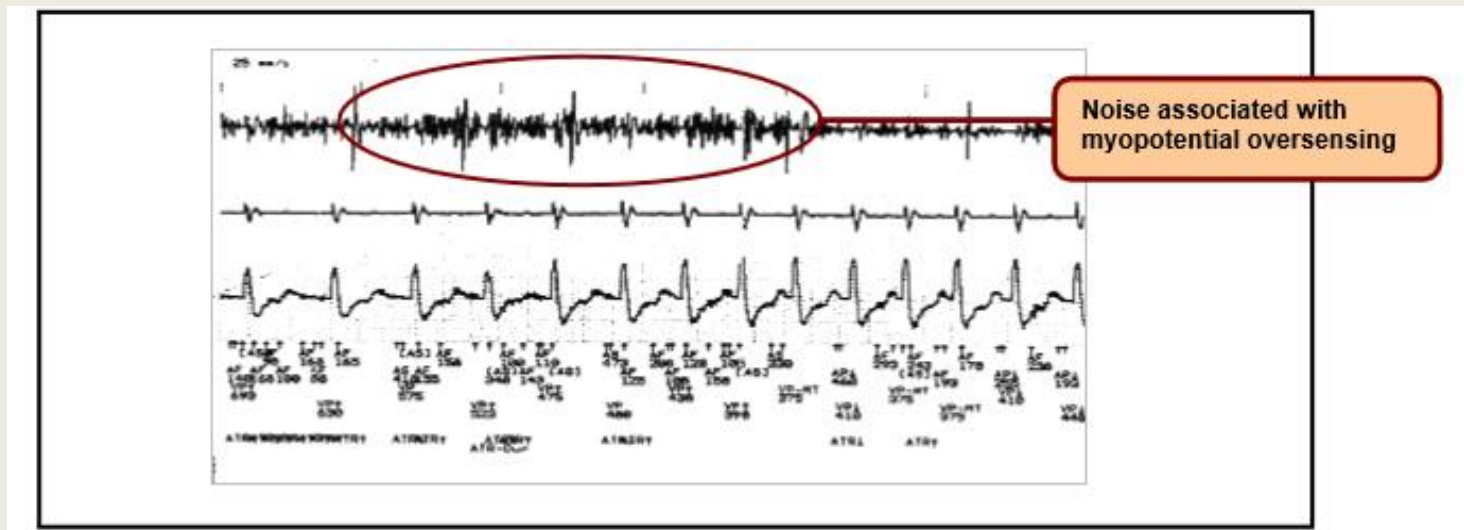


Viewing window



Damaged sealing plug

Bipolar
configuration with
myopotentials



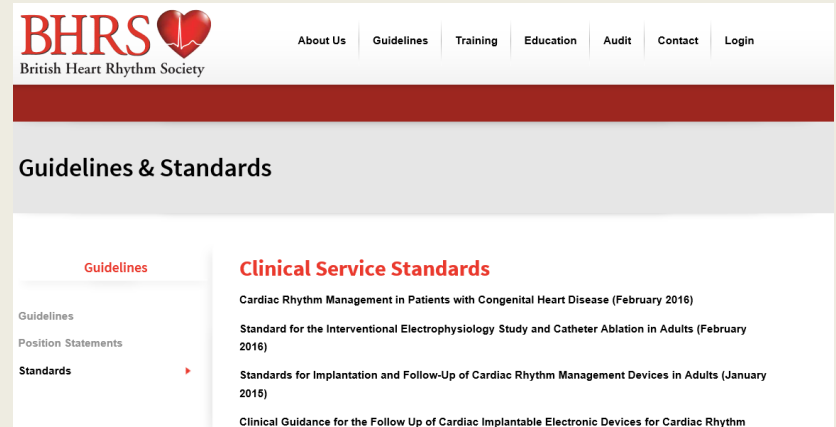
Pacing at max output may stimulate pectoral muscle
Low impedance may be measured

Post implant programming

- Programming protocols
- Rate Response ? IHD , Age, Type of activity
- Lower rate
- Alert set up
- Diagnostics cleared and reset appropriately
- Patient and lead details entered into the device
- If high energy device therapies on!!! – Procedure sign out

Summary

- Planning is essential
- Communication with operator and the rest of the team
- Programing protocols



CRM

Device Programming Protocols

Manchester Heart Centre

Thank you

- Rate response type
 - AAI/DDD vs search AV
 - MRI vs Non MRI
 - Lead position
 - Deployment of active fixation
 - Injury current
 - Sensing
 - QLV
 - Header connections
 - Post op check in cath lab
- Appropriate programming
 - ?
 - ?