Cardiac Catheterisation
Instrumentation

Lancashire & South Cumbria Cardiac Network
Catheter definitions

- Catheter
- French size
- Lumen
- Length
- Guide wire
- Bolus
- Flow
- Radio-opaque
- Radio-translucent
Catheter characteristics

• List as many characteristics as possible
Instrumentation system

- Catheter
- Pressure line & manifold system
- Transducer
- Pressure monitoring system
System criteria

• Stability

• Sensitivity

• Adequate frequency response
Monitoring protocol

- Shift check
- Monitoring equipment
- Pressure lines and kits
- Patient set up
- Procedure start
- Monitoring & recording procedures
- End procedure
Instrumentation Shift Check

• A check of all equipment that may be used during cardiac catheterisation procedures should be checked on a daily/shift basis
• Resuscitation equipment and the consumables attached (defibrillator and leads
• pacing box, leads and availability of bipolar pacing wire
• All general stocks, ECG cables, electrodes
• O2 saturation and ACT machines should be tested and calibrated
• Intra-aortic balloon pumps and accessories should be checked and made available
• Equipment found to be faulty should be replaced immediately
Monitoring equipment

• The monitoring equipment and auxillary equipment including monitors, printers, storage facilities, headphones/microphone systems etc should be initialised in the correct order and any self-test procedures adhered to

• Any problems encountered must be reported immediately to a senior staff member. On-call staff should attempt a repeat start up procedure before moving to an available laboratory if possible and inform the team members as soon as possible
Pressure line & transducer kit

- Heparinised 0.9% saline
- Maintain sterility
- fluid filled – air free
- Zero & calibration
- Prevents backflow of blood
Pressure transducer set up

- Disposable transducers may be set up/flushed in advance for use
- Ensure availability of disposable and permanent equipment including 500ml Heparinised 0.9% Saline, disposable transducer, drip set (pressure monitoring customised if possible), transducer cable and 500ml pressure bag
Set up

- Ensure 500ml 0.9% saline sterile flush solution is heparinised to 5,000 units heparin (0.5ml per 500ml bag)
- Attach the drip set to the saline ensuring sterile technique is maintained
- Flush the drip set ensuring all air bubbles are expelled
Set up

• Connect to the disposable transducer ensuring sterility at all times and flush through ensuring all air bubbles are expelled
• Finally check the whole system for air and remove air bubbles if possible
• If air still remains a new kit must be set up as under no circumstances must air be present in any part of the system
Set up

- Connect the transducer to the pressure cable, ensuring good connection to monitoring equipment exists
- Ensure the transducer is set to the correct height – reference level
- This should be done for every individual patient and is set to the same level as V5
Set up

• Transducers/transducer cabling and equipment should be calibrated and if performed using external calibration equipment should be performed as part of the daily checks

• If possible, check individual transducers through the monitoring equipment. This calibration should be performed at the start of each procedure for every transducer
Set up

• Open the transducer to air and zero equipment
• Place saline in pressure bag and inflate to 200-300mmHg to ensure adequate pressure exists above the patients systolic measurement
Transducer Properties

- Mechanical to electrical
- Strain gauge – wheatstone bridge technology
- Strain defined as fractional change in length

\[ \text{RESISTANCE } \propto \text{ LENGTH} \]
Pressure

Vent to air
Electrical circuit

Resistances are equal – no current flows
R1 & R2 ↑ and R3 & R4 ↓ - current flows
Arrangement of the equipment

• Name as many reference points as possible
Patient set up

- Identify a flat non-muscular electrode site
- Right and left arm electrodes should be placed below the clavicle with a lateral aspect
- Right and left leg electrodes should be placed below the waist out of the radiation field
- Shave if necessary at electrode sites
- Prep the electrode site, dry and place electrodes on prepared site
- For all PCI’s apply radio-translucent electrode to V5 position and ensure it is viewed on all monitors
Start procedure

- Admit patient demographic details
- Enter consultant and staff details
- Start monitoring system recording
Monitoring & Recording

• Follow individual lab protocols for left, right and simultaneous procedures
• Ensure correct ranges/scales are employed throughout the procedure
• Record appropriate artefact free pressure tracings
• Edit pressure tracings to guarantee accurate measurements of systolic/diastolic and mean pressures
• Identify reasons for artefact and communicate this with the operator
• Resolve artefact if possible
Monitoring & recording

- Record accurate log and ensure correct measurements are entered
- Printout log and pressure traces appropriate to the procedure
- Ensure continuous monitoring of patients ECG, pressure changes and haemodynamic status throughout the procedure
- Report any adverse events to the operator and team
Monitoring & Recording

• Take appropriate action to maintain adequate hemodynamics of the patient, including emergency Pacing techniques, cardiac compressions and DC cardioversion/defibrillation and IABP set up

• Ensure continuous monitoring of pulse oximetry if attached through monitoring equipment
Pressure ranges

• Left sided pressures what range?

• Right sided pressures what range?
calibration

- Ensure scale and linked sensitivity is correct
Damping

- Reduction in amplitude & frequency of pressure waveform
Causes of Damping

• List the reasons for damping during cardiac catheterisation
  • (1)
  • (2)
  • (3)
Overshoot & Sensitivity

- Caused by compliance characteristics of the pressure system
- Inclusion of ROSE will eliminate overshoot
- ROSE?
End procedure

- Discard pressure kit and transducer
- Place sharp end of drip set in sharps bin
- Disconnect electrodes from patient
- Ensure area clean and tidy, any equipment used is replaced
- Set up new kit and transducer
- Save all data to hard drive and set up equipment for next patient
- At end session/day switch off monitoring system, screens and resuscitation equipment but ensure charging procedures are followed
- At end session/day ensure DAT tapes/hard drives data storage is complete
• ANY QUESTIONS?