Care of the patient with an Intra-Aortic Balloon Catheter

This guideline is approved for use in Nepean Adult ICU only, where a patient receives continuous monitoring. The authors and Nepean ICU don’t endorse, and aren’t responsible, for the use of this guideline outside the ICU.

Purpose
The Intra-Aortic Balloon catheter is inserted via the femoral artery into the ascending aorta. It is positioned just below the subclavian artery and just above the renal artery. It improves myocardial performance by increasing coronary artery perfusion and myocardial oxygen supply while decreasing the pressure the left ventricle must work against (afterload) and reducing oxygen demand.

* Special Note Concerning Staffing *
There must be a Registered Nurse designated to be with the patient at all times i.e. 1:1 nursing ratio even if the patient is not ventilated. The bed rails must be kept up at all times when not directly attending the patient.

Definitions
Intra-Aortic Balloon (IABP): a balloon inserted into the aorta of the patient which is timed to inflate and deflate with the patient’s cardiac cycle to improve myocardial oxygen supply while decreasing left ventricular workload.

Procedure
Equipment:
- IABP console
- Doppler for assessing limb circulation

Setting up the IABP console:
- Ensure the console is on ‘power’ while the patient is in ICU to ensure battery is completely recharged (IABP has a 4 hour battery life).
- Prior to the insertion of the catheter, perform a full assessment of the patient, including circulation observations to both legs to obtain baseline information.
- Set up the ECG:
  - Direct lead attachment - attach the ECG dots to the patient’s chest and place small opsite dressings over the ECG dot once the lead has been connected to prevent accidental loss of lead. The ECG select on the display panel needs to be on ‘skin’.
- Set up the transducer:
  - Once the catheter has been inserted, attach the arterial pressure transducer to the front of the IABP machine, ensure that ‘x-ducer’ is select.
  - Ensure the transducer is zeroed as any other pressure line.
Once the catheter is inserted, the Medical Officer performing the insertion will hand the helium line to the nurse. This line is then attached to the front of the IABP machine and pumping can commence.

Turn the machine to ‘standby’ (you will hear four rapid balloon inflations which uncoils the balloon on the catheter).

Check that the machine has a trigger – the Arrow Autocat will automatically select the best trigger for the patient.

Turn the pump to on.

**Triggering:**

- A reliable trigger signal needs to be established prior to pumping. The IAB console needs a stimulus to cycle the pneumatic system that inflates and deflates the balloon. The trigger signal tells the IAB machine that the cardiac cycle has begun.

- For more information about the types of triggering available, please see the education notes.

- The Arrow Autocat IABP, the machine will automatically choose the most appropriately trigger mode for the patient if the Autopilot mode is selected.

- Arrhythmia Timing Control Key: is located below the trigger key on the front panel. Arrhythmia timing is only available in Autopilot mode. Selecting this key will automatically implement R-wave deflation when an arrhythmia is detected. When the R-wave deflation is on, the pump will automatically select AFib trigger at all times even when no arrhythmia is present.

**Timing:**

- Timing the inflation and deflation of the balloon to the patient’s cardiac cycle is essential to optimally support the cardiac cycle for the patient and achieve the haemodynamic effects of the IABP.

- The efficiency of IABP depends on the accuracy of the inflate and deflate timing settings. It is essential that the operator fully understands the haemodynamic signs of proper timing and the adverse effects of improper timing.

- Timing must be done while the patient is in 1:2 augmentation ratio. During timing, the operator must be aware of the patient’s blood pressure as it may drop with the reduction in augmentation. If the patient’s mean blood pressure does drop, timing must be interrupted and the patient placed back onto 1:1 augmentation ratio.

- Timing must be checked at least once every shift (during the patient assessment) and with any change in the patient's cardiac rhythm. A printed copy of the timing must be included in the patient’s medical record.

- When using the Arrow Autocat IABP, the machine will automatically time when the machine is in ‘autopilot’. However, in autopilot, the IABP is not always optimally timed to the patient’s cardiac cycle and autopilot should only be used if the operator is unable to manually obtain optimal timing.

**Nursing Care:**

- The patient is to have an IABP observation chart in addition to Intensys.

- Hourly recording of the patient’s heart rate, blood pressure and circulation observations are to be done with other vital signs recorded as per usual ICU practice.

- Hourly urine output must be recorded. A sudden drop in the patient’s urine output may indicate that the catheter has been displaced.
• Inspect the site of insertion every 4 hours for bleeding or haematoma formation.
• The bed rails must be kept up at all times when not directly attending to the patient.
• The head of the bed is not to be elevated higher than 30°
• Do NOT take blood from the balloon catheter
• Avoid hip flexion on the leg with the catheter inserted.
• Monitor for complications, including limb ischaemia, bleeding and infection. Other possible complications include balloon rupture, helium embolus and aortic rupture or dissection. Balloon rupture is characterised by blood in the gas tubing, decreased augmentation, neurologic deficits, loss of pressure alarms or loss of gas alarms. If balloon rupture is suspected, stop the pump immediately and call for assistance.

Weaning:
• IABP therapy may be weaned prior to the removal of the catheter.
• Weaning is at the discretion of the treating cardiologist / intensivist.
• Weaning may be achieved by a reduction in the ratio of augmented to non-augmented beats from 1:1 to 1:2, 1:4, and 1:8.

Risk Rating
Low – For Review 3 years from validation date unless significant and compelling evidence becomes available to indicate a practice change within that time.

Implementation Plan
Endorsed by ICU Management Committee
Discussed at ICU Ward Meetings and other relevant unit meetings
New Procedure placed in ICU Communication Book
Electronic file loaded onto ICU website
Education and in service provided to relevant staff

Education Notes
Risks
Risks associated with the insertion of an IABP include:
• Aortic wall dissection, rupture or local injury.
• Air, thrombus or plaque emboli.
• IABP catheter balloon rupture causing a helium embolus.
• Infection.
• Obstruction of major vessels due to malpositioning of the catheter.
• Compromised circulation to the leg due to catheter leading to ischaemia or compartment syndrome.
• Thrombocytopenia.
• Bleeding.

Triggering:
• The following are the available trigger modes for the Arrow balloon pump:
• **ECG Pattern:** the IABP analysis the height, width and the slope of a positively or negatively deflected QRS complex. Do not use in patients with a widened QRS complex such as bundle branch blocks.

• **ECG Peak:** the IABP analysis the height and the slope of a positively or negatively deflected QRS complex. Preferred trigger choice for heart rates > 140.

• **A-FIB:** the IABP analyses in the same way as in ECG peak. Deflation of the balloon cannot be controlled by the operator as the balloon will automatically be deflated whenever an R wave is sensed.

• **V Pace:** the IABP uses the ventricular spike as the trigger signal. It can be used for either ventricular or AV pacing. The patient MUST be 100% paced for this trigger modality.

• **A Pace:** the IABP uses the atrial pacing spike to trigger the machine. The patient MUST be 100% paced.

• **Arterial Pressure:** the IABP uses the systolic upstroke of an arterial pressure waveform as the trigger signal.

• **Internal:** the balloon inflates and deflates at a pre-set rate regardless of the patient’s cardiac activity. It can only be used when there is no cardiac output.

**References and Related Policies**
August 2010. Care of the Patient with an Intra-Aortic Balloon Pump.

**Version History**

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