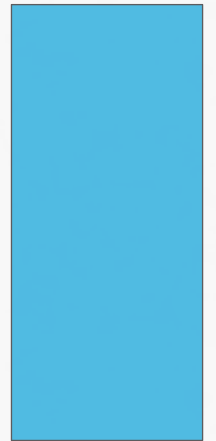


INVASIVE MONITORING



AIMS OF THE SESSION

- Enable you to care for both CVP and arterial lines safely
- Be able to assist with insertion
- Be able to safely remove a CVP

CVP'S

- A central line is an intravenous line where the tip sits just above the right atrium in either the Superior Vena Cava or Inferior Vena Cava.
- Purpose: Reflects the volume of fluid returning to the right side of the heart (Right atrial pressure) and the ability of the heart to pump the blood in the arterial system.



CVP

- Reasons to have:
- Measurement of central venous pressure (CVP)
- Administration of drugs (inc those that cannot be given peripherally- inotropes, amiodarone)
- Parenteral Feeding (TPN)
- Obtain blood tests
- Venous access problems/ long term IV access

INSERTION

- CVP pack
- Chlorhex 2% solution or snap stick
- US machine
- Sterile gloves, gown, mask
- Local anaesthetic
- Transducer set run through from 500ml 0.9% N saline bag
- Pressure bag set to 300mmHg
- Transducer cable/ plate/ appropriate monitor

USES

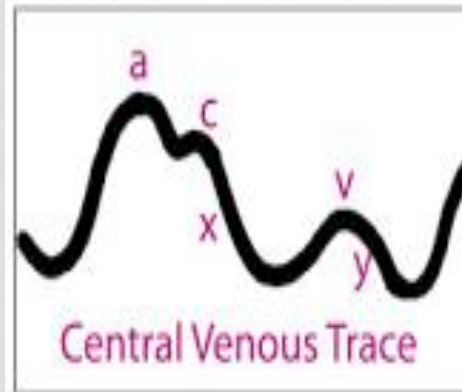
- Estimate circulating volume
- Guide fluid administration
- Assist in assessment of cardiac function and vascular tone
- Aid assessment of treatment response

- Note:
- Trend more useful than single reading
- Should be considered alongside BP, UO, patient assessment

TAKING MEASUREMENTS/ WAVEFORMS

- Explain to woman what doing
- Flush line to ensure patency
- Position to supine if possible, align transducer to fifth intercostal space (mid axilla)
- Check the CVP trace
- Document reading and refer on as appropriate

This waveform is obtained from the tracing of a central venous line.



🔍 A wave - due to atrial contraction. Absent in atrial fibrillation. Enlarged in tricuspid stenosis, pulmonary stenosis and pulmonary hypertension.

🔍 C wave - due to bulging of tricuspid valve into the right atrium or possibly transmitted pulsations from the carotid artery.

🔍 X descent - due to atrial relaxation.

🔍 V wave - due to the rise in atrial pressure before the tricuspid valve opens. Enlarged in tricuspid regurgitation.

🔍 Y descent - due to atrial emptying as blood enters the ventricle.

🔍 Cannon waves - large waves not corresponding to a, v or c waves. Due to complete heart block or junctional arrhythmias.

• Increase in readings:

• Hypervolemia

• Forced exhalation

• Tension

Pneumothorax

• Heart Failure

• Pleural effusion

• Decreased cardiac
output

• Cardiac tamponade

• Decrease in readings:

• Hypovolemic

• Deep inhalation

CARE OF THE PERSON WITH A CVP

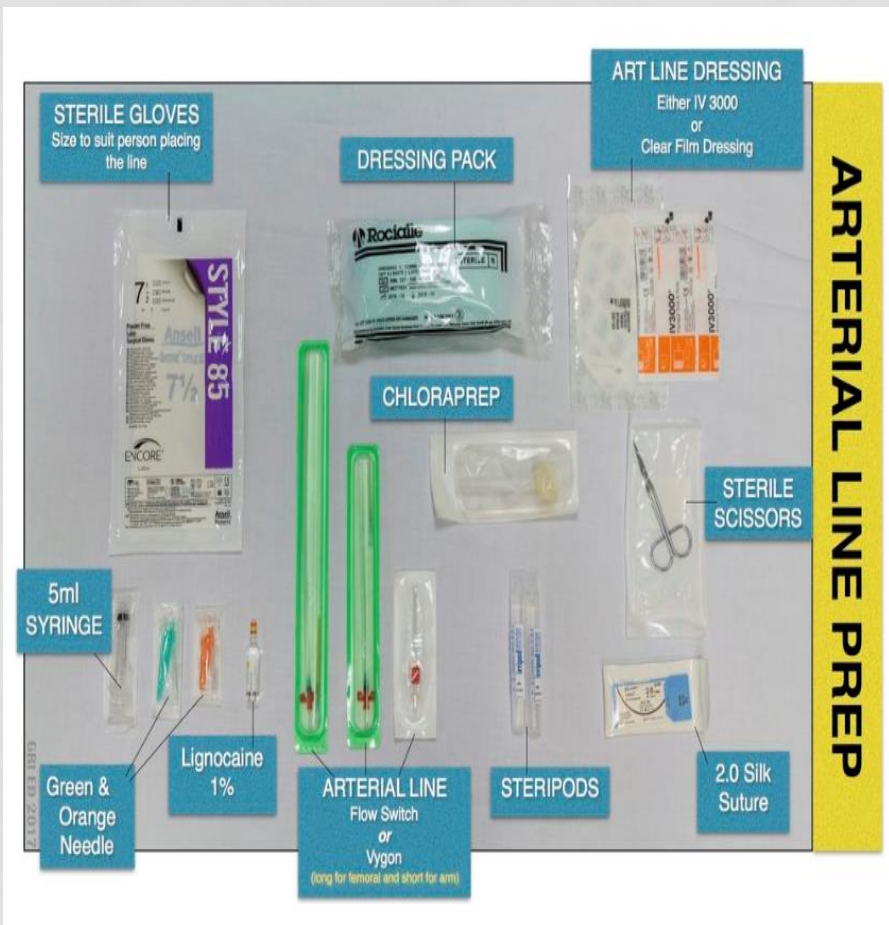
- Close monitoring for signs of complications
- Documents any interventions, changes in site/ length at site
- Renew dressing as per local guidance
- If not in use flush regularly/ remove
- Transducer set to be changed every 48 hours
- Ensure regularly all ports secure
- **Removal:**
 - As per local guidance
 - Check clotting prior to removal
 - Explain procedure
 - Detach any lines
 - Aseptic technique
 - Position supine with slight head down tilt
 - Remove Stitches
 - Slowly remove catheter
 - Apply pressure (min 5 mins or until bleeding stops)
 - Dress with Gauze and clear dressing
 - Check complete (inc tip)- send for MC&S of infection screen needed
 - Document removal

ARTERIAL LINES

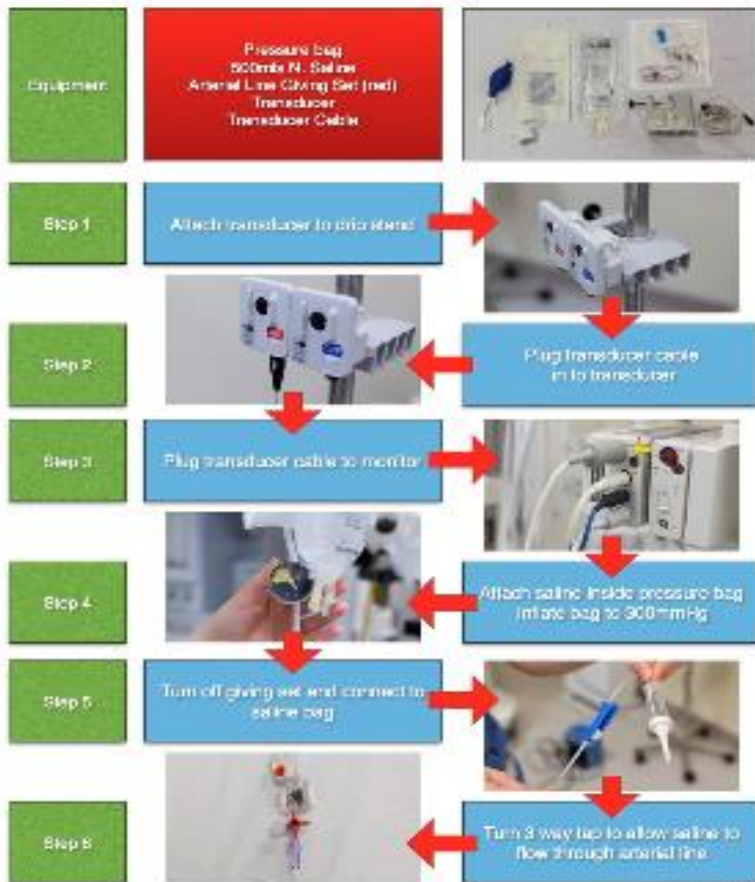
- Advantages:
- Beat to beat measurement of BP
- Frequent arterial blood gases
- Frequent blood sampling
- More accurate if arrhythmias or hypotension
- Useful where NIBP is difficult e.g. obesity
- Information about cardiovascular status

HOW TO SET UP ARTERIAL LINES

- Intra-arterial cannulae
- Fluid filled tubing:
 - NaCl 0.9%
 - No bubbles in system.
 - No 3 way taps.
 - Pressurised to 300mmHg
- Transducer: right atrium.
- Monitor: zeroing.
- Common sites
- Radial artery
- Brachial artery
- Dorsal pedis artery
- Femoral artery



ARTERIAL LINE SETUP



GM 08 08 17

- Potential complications
- Bleeding if tap left open
- Injection of drugs into it
- Incorrect siting
- Tissueing
- Infection
- Arterial damage
- Haematoma

CARE OF WOMEN WITH ARTERIAL LINES

- Observe limb for perfusion
- Observe cannula site for infection
- Take blood samples using sterile technique
- Ensure all ports secure with an intervention
- Change fluid bag every 48hours
- Change giving set every 5 days
- Change dressing as per local guidance
- Ensure no blood/air bubbles in circuit
- 1:2 ratio to look after arterial line.

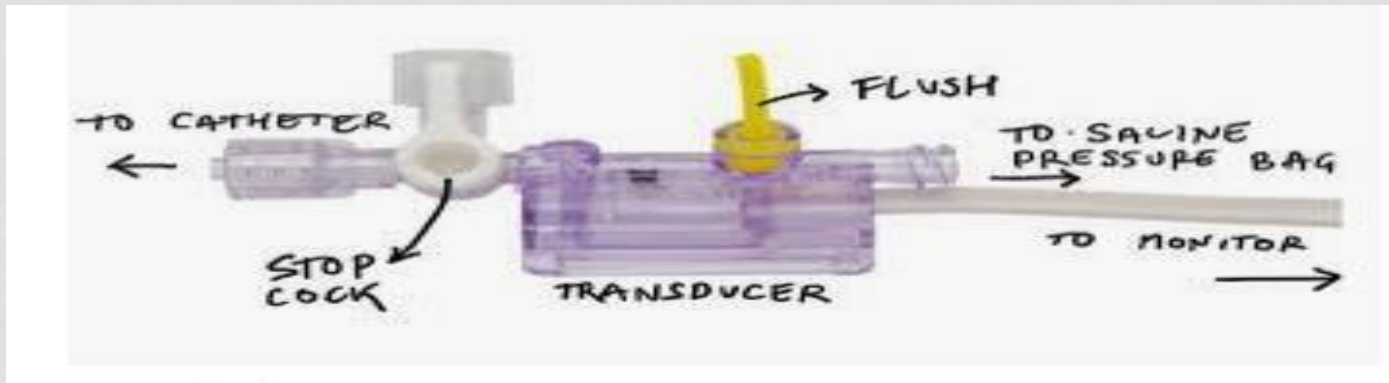
ZEROING

- Every four hours both the CVP and Arterial line should be zeroed to calibrate them with zero pressure
- Position patient supine
- Flush the system using the pull flush on the transducer
- Level the transducer (align with mid axilla fifth intercostal space)
- Turn the tap on the port closest to the transducer so it is OFF to the patient
- Remove the cap so it is 'open to air'
- Press zero on the monitor
- Ensure zero appears, then replace the cap and re-open to patient
- Record time of zeroing



RECORDINGS

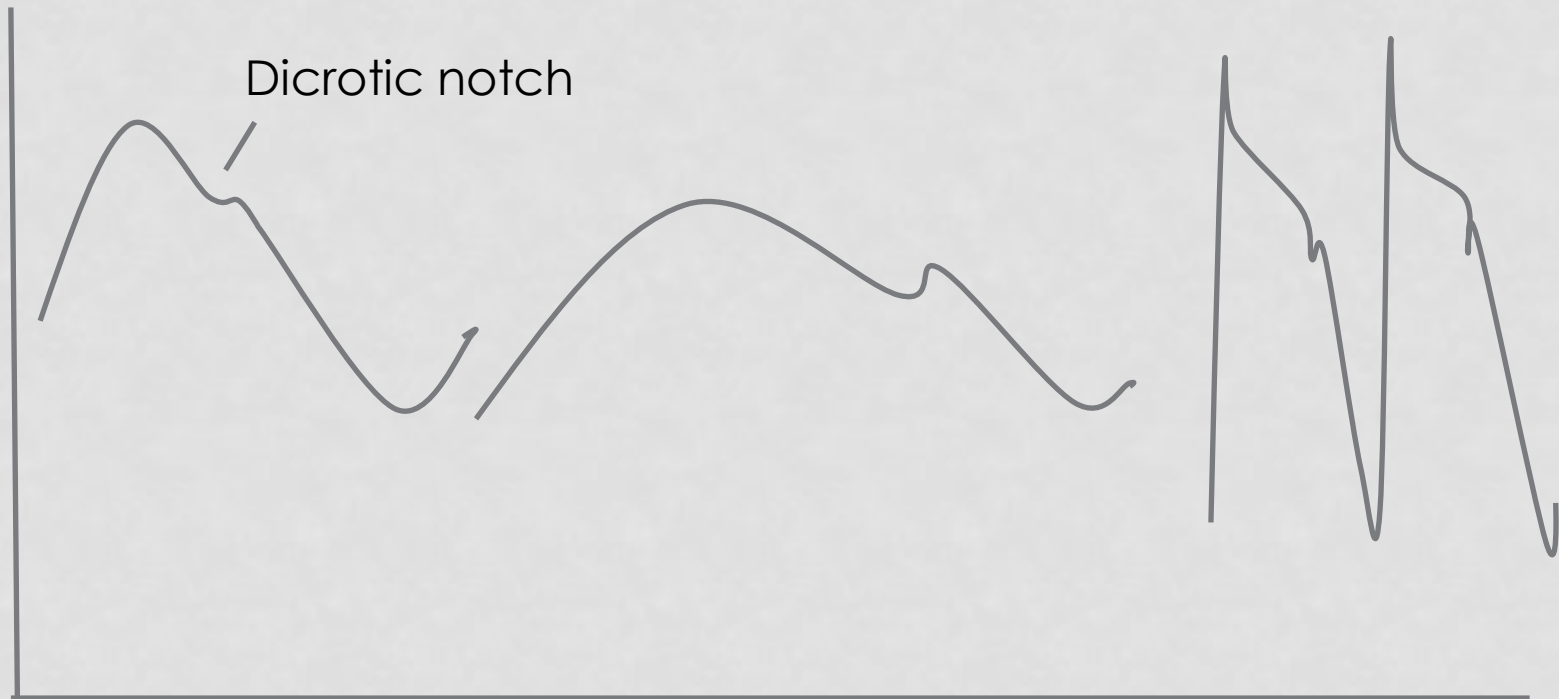
- Explain what going to do
- Position as we did with CVP reading
- Check the flush system is pressurised to 300mmHg (inflate bag over the 500ml bag of saline, ensuring pressure in green zone) and flush the line
- Zero the transducer (on the machine)
- Check the arterial trace
- Document the reading, refer as necessary



ARTERIAL LINE TRACE

Normal
Underdamped

Overdamped



TROUBLESHOOTING

Difficulty Zeroing	<ul style="list-style-type: none">• Check all equipment and connections• Ensure all roller clamps open• Check system for blood clots/ air bubbles• Check flush bag volume and pressure• Replace transducer, cable, monitor, replace
Unable to aspirate	<ul style="list-style-type: none">• Check lines for kinks• Apply traction to cannula• Gently try to flush (anaesthetist)• Replace line
Falsely high readings	<ul style="list-style-type: none">• Incorrect placement of transducer (below level of heart)• Calibration issue• Under damped trace• Swapped invasive pressure cables
Falsely low readings	<ul style="list-style-type: none">• Incorrect placement (above level of heart)• Kinked cannula• Over damped trace• Swapped cables
Dampened Trace	<ul style="list-style-type: none">• Check position of transducer• Re-Zero• Remove kink• Remove all bubbles/ clots

REMOVAL

- Check clotting prior to removal
- Ensure peripheral access patent
- Aseptic procedure
- Remove dressing
- Slowly remove and apply pressure (for a minimum of five minutes or until bleeding stops)
- Dress with gauze and clear dressing
- Check catheter tip complete and skin for signs or pressure/ infection
- Document removal

QUESTIONS?

TAKE HOME POINTS

- Never use fluid other than Normal saline 0.9%
- **NEVER inject into arterial line**
 - It is only used for BP measurement and blood sampling.
- If problems ask for anaesthetist/ ODP to review