

What?

Arterial catheter/cannula (usually 20G) inserted into

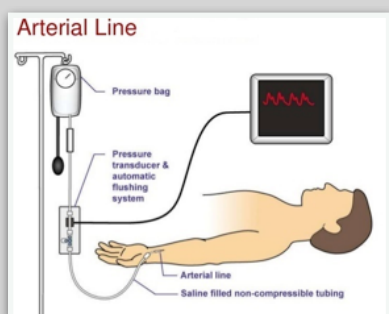
an artery and connected to a pressure transducer, automatic flushing system, non-compressible rigid walled fluid filled tubing, pressure bag and slow automated infusion (1-3ml/hr) of pressurized saline.

What are the indications?

- 1) Requirement for close, accurate BP monitoring (e.g. when on vasoactive infusions)
- 2) Need for frequent sampling
- 3) Need for close tracking of 'gas exchange'
- 4) As part of cardiac output monitoring

How does it work?

Fluctuations of vascular pressure inside the artery cause a pulsation of the saline column which displaces an electromanometer's diaphragm with a built-in strain gauge (Wheatstone bridge principle). This leads to a change in resistance of the strain gauge which is sensed electronically. A wave form is built by Fourier analysis from sinusoids or simple wave forms. Wave forms differ depending on where the cannula is inserted.



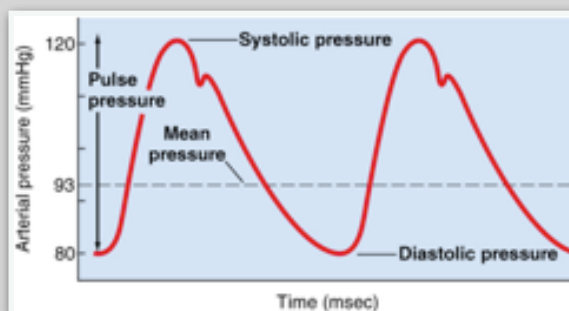
What is zeroing?

The transducer is placed at the level of the heart. A 3 way tap is turned 'off to patient, open to air'. Zeroing removes the effect of atmospheric pressure from the reading. Whenever patient position is altered the transducer height should be altered, or else there will be a difference of pressure reading of 10mmHg for every 1m adjusted.

What use is the trace?

The obvious values given are systolic, diastolic, mean and pulse pressure. Mean arterial pressure is more useful than systolic or diastolic as it is least dependent on insertion site, least altered by damping and determines tissue blood flow by

autoregulation. Pulse rate and rhythm can be assessed. Cardiac output monitoring can be done using pulse contour analysis. Pulse pressure variation can be calculated which gives an idea of



fluid responsiveness. The 'steepness' of the initial upstroke is an indication of contractility. Area under the upstroke is equal to the stroke volume. Steep downstroke indicates low systemic vascular resistance. Specific waveform morphologies may be diagnostic, for example, slow rising in aortic stenosis or pulsus alternans indicating tamponade.

What are the hazards?

Complications are rare if inserted with care, but may include pain, thrombosis or distal ischaemia, blood loss, air embolism, inadvertent drug or air injection, haematoma, pseudo-aneurysm and arterial dissection. These are all incredibly rare, and this is generally a very safe procedure.

Which arteries are OK?

Consider patient comfort and mobility (e.g. which is their dominant hand?). Also, consider consequences of arterial occlusion. The radial is commonly used as there is collateral arterial supply to the hand via ulnar and palmar arch arteries. Avoid brachial as thrombus here will cause distal ischaemia. Despite being an 'end-artery' the femoral is OK as it is unlikely to thrombose due to large calibre and high flow.

Troubleshooting

A 'damped' trace or a loss of trace can be due to the following causes: kinked or obstructed cannula, air bubble in tubing or transducer, inaccurate zeroing and levelling. Zeroing has already been mentioned. For an 'obstructive' cause, one can perform a 'flush test'. Manually flush the line at the level of the transducer or stop clock. If you think the cannula is kinked, you can gently withdraw it a few mm and try to flush it.