

Direct arterial blood pressure this is achieved by attaching a transducer to an intra-arterial cannula. This is an invasive procedure which carries potential morbidity. Thus, the method is justified only when rapid changes in arterial pressure are anticipated during anesthesia.

Some indications for arterial cannulation include

1. Patients undergoing major surgery (cardiothoracic surgery, major vascular surgery, surgery for pheochromocytoma, neurosurgery
2. Induced hypotension
3. ICU patient requiring inotropic support, and hemodynamically unstable patients, (critically ill and shocked pts).
4. Necessity for frequent blood gas analysis (pts. With resp. failure on ventilator, and severe acid/base disturbance

☒ Selection of artery for cannulation

1. Radial artery: has low complication rates compared with other sites and is commonly cannulated because of its superficial location which aids insertion and also makes it compressible for hemostasis, collateral flow (5% of pt. however have incomplete palmar arches and lack adequate collateral blood flow

When using the radial artery, the non-dominant hand should be used if possible .and also Allen's test should be done

2. Ulnar artery: catheterization is more difficult because is more difficult because of the artery is deeper and more tortuous course and this should not be considered if the ipsilateral radial artery has been punctured but unsuccessfully cannulated

3. Brachial artery: is large and easily identifiable in the antecubital fossa its proximity to the aorta provides less wave form distortion. being near the elbow predisposes brachial artery catheters to kinking

4. Femoral artery. Is prone to aneurysm and atheroma formation but often provides an access of last resort in burn or traumatic victims, a septic necrosis of the head of the femur is a rare but tragic complication of femoral artery cannulation in children

5. The dorsalis pedis arteries are selected most frequently used for cannulation.

☒ **Allen's test:** is recommended before the insertion of a radial arterial line. a simple—but not completely reliable method for determining the adequacy of ulnar collateral circulation in case of radial artery thrombosis

First, the pt. exsanguinates the hand by making a fist, while the operator occludes the radial and ulnar arteries with finger- tip pressure the pt. relaxes the blanched hand. collateral flow through the hands arterial arches is confirmed by flushing of thumb with 5 seconds after pressure on the ulnar artery is released, delayed return of normal colour indicates an equivocal (>10 seconds)

Alternatively, blood flow distal to radial artery occlusion can be detected by (Doppler probe, Plethysmography, or pulse –oximetry (unlike Allen’s test, these methods of determining the adequacy of collateral circulation do not require pt. cooperation)

Contraindications: in arteries without documented collateral blood flow and in extremities where there is a suspicion of preexisting vascular insufficiency (e.g. Reynaud’s phenomenon)

☒ **Equipment’s**

1. Arterial cannula: made from polytetrafluoroethylene (Teflon) to minimize the risk of clot formation.

20G (pink colour) adult pts, 22G (blue colour) pediatrics, 24 G (yellow) neonate and small babies.

Large gauge cannula increases the risk of thrombosis, smaller cannula cause damping of signal.

The cannula is connected to an arterial giving set.

2. **Arterial set:** Specialized plastic tubing, short and stiff to reduce resonance, connected to a 500 ml bag of saline

3. **Saline bag:** 500 ml 0.9% saline pressurized to 300 mmHg using a pressure bag, i.e. a pressure higher than arterial systolic pressure to prevent backflow from the cannula into the giving set .

The arterial set and pressurized saline bag with **2500** units

Heparin incorporate a continuous slow flushing system of 3–4 ml per hour to keep the line free from clots.

The arterial set and arterial line should be free from air bubbles. The line is attached to a transducer.

☒ Do not allow the saline bag to empty.

- To maintain patency of cannula
- To prevent air embolism
- To maintain accuracy of blood pressure reading
- To prevent back flow of blood

4. Transducer, amplifier, and electrical recording equipment.

for accurate reading the transducer should be on the same level as the heart and must be first be calibrated to zero

5. Tape and /or sterile strips

6. An arm board or towel roll

7. Local anaesthetic (1% or 2% lidocaine, lidocaine cream)

8. Suture material for femoral arterial line placement.

9. Monitor cable for transducing arterial wave form

☒ Procedure

1. Assure that pressure tubing with transducer is connected to bedside monitor
2. Perform the Allen's test to assure adequate collateral blood flow if using radial artery

3. Wash hand and don gloves
4. For the radial artery, the arm restrained, palm up, with an arm board to hold the wrist dorsiflexed
5. Apply anaesthetic agent, cleanse area selected, and prepare patient for puncture.
6. Locate pulsating artery via palpation, stabilized artery by pulling skin taut.
7. Puncture skin at 45-60° angle for radial artery, 90° for femoral artery.
8. Advance catheter when flush of blood is observed in catheter and connect to pressure IV tubing and check for arterial wave form on bedside monitor

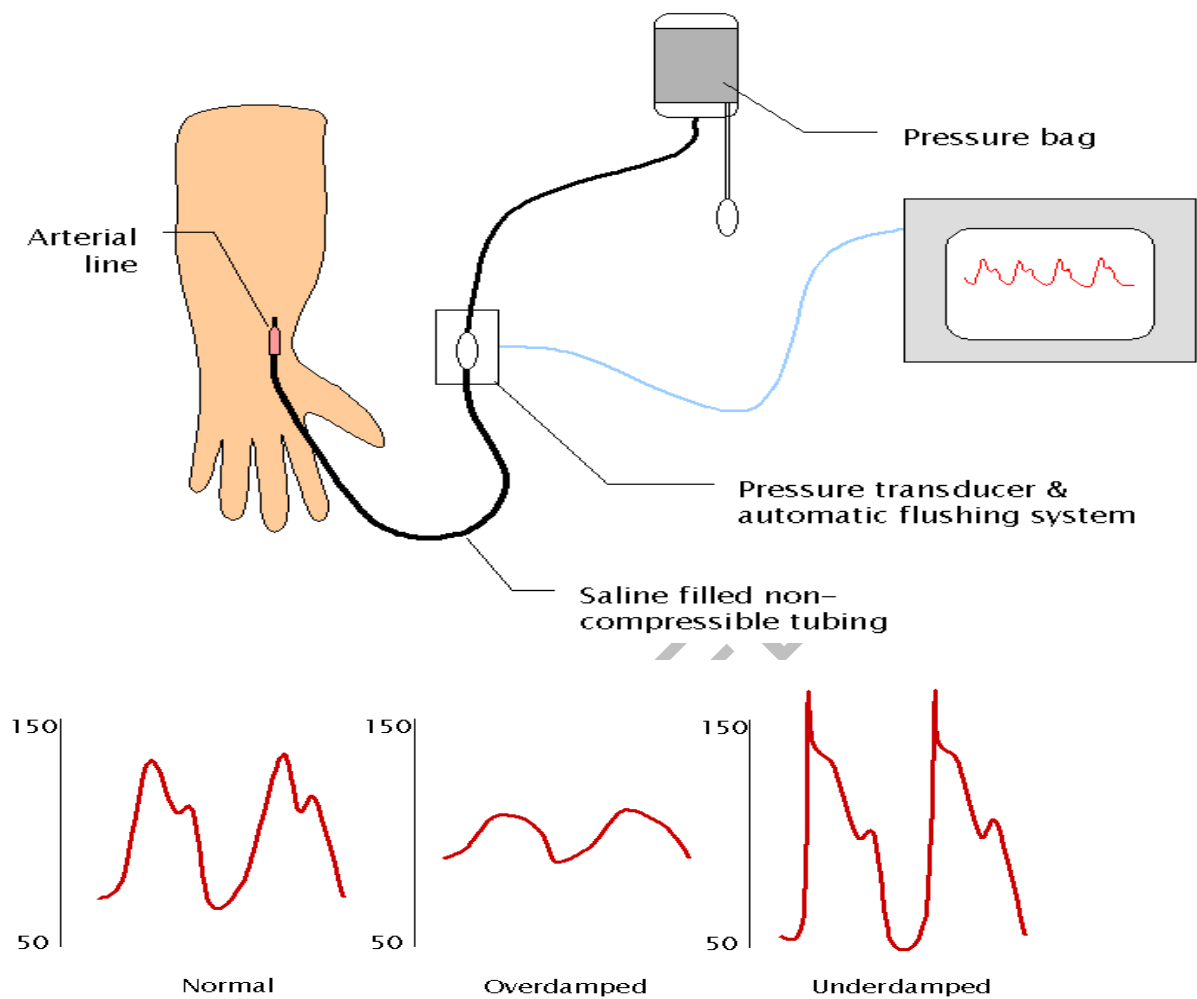
☒ Complications:

1. Hemorrhage occur if there are leak in the system
2. Embolism, air or thrombus embolism may occur, care should be taken to aspirate air bubbles
3. Accidental drug injection may cause severe irreversible damage to the hand

The arterial cannula should be labeled (in red) and isolated to avoid any injection through it.

4. Arterial vasospasm

5. Partial occlusion due to large cannula width, multiple attempt to insertion and long duration of use, and permanently total occlusion
 6. Local infection and sepsis or Bacteremia, if the area looks inflamed the line site should be changed.
- ☒ The advantage of invasive arterial pressure Monitoring are continuous reading and accurate blood pressure (beat to beat) recording even when pts is profoundly hypertensive vs. NIBP which is difficult or inaccurate, instantons reading, pressure wave form displayed (real time visual display), and easy blood sampling
 - ☒ The disadvantages of IBP measurement include (potential complications, skilled technique required, and expensive



☒ **Over damping** (wide flattened tracing) occurs due to Air bubbles, over compliant and distensible tubing, catheter kinks, clots, injection port, low flush bag pressure or no fluid in the flush bag, improper scaling,

Sever hypotension if everything else is ruled out

This type is underestimate SBP, and overestimate DBP

☒ **Under damping** (resonant: spike tracing) occurs due to

Long tubing, overly stiff and non-compliant tubing, increased vascular resistance, not fully opened stopcock valve, this type of trace over estimate SBP and under estimate DBP

- ☒ When we remove the cannula a pressure for 5-10min are applied to the area, after the patient is hemodynamically stable, needs only one or two blood draws in a day, no more need for ABGs

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