

# Arterial Pressure Monitoring: Artifacts & Zeroing

## Anesthetic Pearls: Anesthetic Management of Arterial Line Zeroing and Artifacts

Transducers convert the mechanical energy of a pressure wave into an electrical signal via a Wheatstone bridge circuit. The transducer system is zeroed by opening the stopcock to atmospheric pressure and indicating to the monitor that this is the **“zero” reference point**.

Supine patient => pressure transducer leveled to the midchest position in the midaxillary line

Sitting patient => pressure transducer aligned with the patient's ear to approximate the level of the Circle of Willis to better estimate cerebral perfusion pressure



The highest point is the systolic pressure and the lowest is the diastolic pressure. The small deflection on the diastolic downslope in each beat is called the **“dicrotic notch”**. Just after the start of diastole, the aortic valve closes and generates a small amount back-pressure due to the elasticity within the arterial tree (ascending / arch / descending aorta). The back-pressure is transmitted to the arterial transducer as a slight positive deflection in the arterial line tracing. As the elasticity within the arterial tree decreases (aging, atherosclerosis, endo-vascular stents), the amount of positive deflection and observation of the dicrotic notch also decreases. The dicrotic notch can be important when using setting an intra-aortic balloon pump or external cardiac pacing device.

### Most common mistakes:

1. failure to establish zero
2. failure to re-check zero when transducer drift occurs
3. failure to re-level transducer appropriately when changes in patient position are made
  - raising patient above transducer --> artificially high pressures
  - lowering patient below transducer --> artificially low pressures

### Over-damped system (**Blunted**):

-Waveform has slurred upstroke and absent dicrotic notch

-Factors causing over-damping:

1. diaphragm that is too rigid (< 2 oscillations)
2. partially closed stopcocks
3. air bubbles
4. bends / kinks in the tubing
5. clots at the tip of the catheter

### Under-damped system (**Hyper-resonant**):

-Waveform appears to overshoot; sharp systolic peak

-Secondary to reverberation of pressure waves within the monitoring system

-Factors causing hyper-resonance:

1. diaphragm that vibrates for a prolonged time (> 5 oscillations)
2. long connecting lines (> 1.4 m)
3. small tubing (< 1.5 mm)
4. catheter occludes the arterial vessel

