# **Plateau Pressure**

# Plateau Pressure (Pplat) in Mechanical Ventilation

## Definition

**Plateau pressure (Pplat)** is the pressure applied to **small airways and alveoli** during mechanical ventilation when airflow is momentarily paused at the end of inspiration. It reflects **lung compliance** and helps assess the risk of **ventilator-induced lung injury (VILI).** 

### How is Plateau Pressure Measured?

- Measured using an **inspiratory pause maneuver** (0.5–1 second) on a ventilator.
- Represents **static lung compliance** (not affected by airway resistance).
- Formula for Driving Pressure (ΔP):
  - $\circ \Delta P$  = Pplat PEEP \*
- Driving pressure is a key predictor of mortality in ventilated patients.

#### **Recommended Target Values**

- General ICU Patients & ARDS:
  - $\circ$  Pplat  $\leq$  30 cmH<sub>2</sub>O (to reduce risk of lung overdistension and barotrauma).
- Acute Brain Injury (ABI) Patients (e.g., TBI, ICH, SAH, Stroke):
  - Pplat  $\leq 25$  cmH<sub>2</sub>O (to minimize effects on cerebral perfusion).
  - Avoid excessive PEEP to prevent increased intracranial pressure (ICP).

#### Clinical Significance in ABI Patients (VENTIBRAIN Study)

- Higher Pplat was associated with increased ICU and 6-month mortality.
- No strong correlation with neurological outcomes.
- Suggests ventilation practices should balance lung protection with cerebral hemodynamics.

#### High Plateau Pressure: Causes & Risks

- Decreased Lung Compliance: ARDS, pneumonia, pulmonary edema, lung fibrosis.
- Excessive Tidal Volume: Overdistension of alveoli.
- High PEEP: Can elevate Pplat and affect venous return.
- Air Trapping (Auto-PEEP): Common in obstructive lung diseases.

#### Strategies to Lower Pplat

- Reduce Tidal Volume (VT): Target 4-6 mL/kg of predicted body weight (PBW) .
- Adjust PEEP Carefully: Avoid excessive PEEP in ABI.
- Optimize Sedation & Paralysis: If needed, to reduce patient-ventilator dysynchrony.
- Consider Recruitment Maneuvers: If compliance is severely decreased (ARDS patients).

#### **Key Takeaway**

- **Pplat** ≤ **30 cmH**<sub>2</sub>**O** is the general ICU goal.
- For ABI patients, Pplat ≤ 25 cmH<sub>2</sub>O may be preferable to avoid secondary brain injury.
- **Higher Pplat increases mortality risk** but its effect on neurological outcomes remains uncertain.

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Last update: 2025/02/25 08:02