

العناية المركزة\الكورس الاول

MODS OF MECHANICAL VENTILATION

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قسم تقنيات التخدير

.....3..... Stage

....المرحلة 3.....

...محاضرة رقم 3...

نظري

Lecture No.

Theoretical

.....3..

استاذ المادة : ...د.ضي عبد
الكريم.....

CLASSIFICATION

- Negative Pressure Ventilation
- Positive Pressure Ventilation
 - Volume Controlled
 - Pressure Controlled

Negative Pressure Ventilation

- These exert negative pressure on external chest decreasing the intra-thoracic pressure during inspiration, allows air to flow into the lungs, filling its volume.
- These are simple to use and do not require intubations of the airways; consequently, they are especially adaptable for home use.
- It is used mainly in chronic respiratory failure associated with neuromuscular conditions.

Contd

- **Examples:** Iron lung, body wrap and chest cuirass
- **Disadvantages**
 - Limited access for patient care
 - Inability to properly monitor pulmonary mechanics
 - Patient discomfort



Positive Pressure Ventilation

- A positive pressure ventilation inflates the lungs by exerting positive pressure in the airway forcing the alveoli to expand during inspiration. Expiration occurs passively.
- It requires an artificial airway (endotracheal or tracheostomy tube) and use positive pressure to force gas into patient's lungs.
- Inspiration can be triggered either by the patient or machine.

Positive Pressure Ventilation

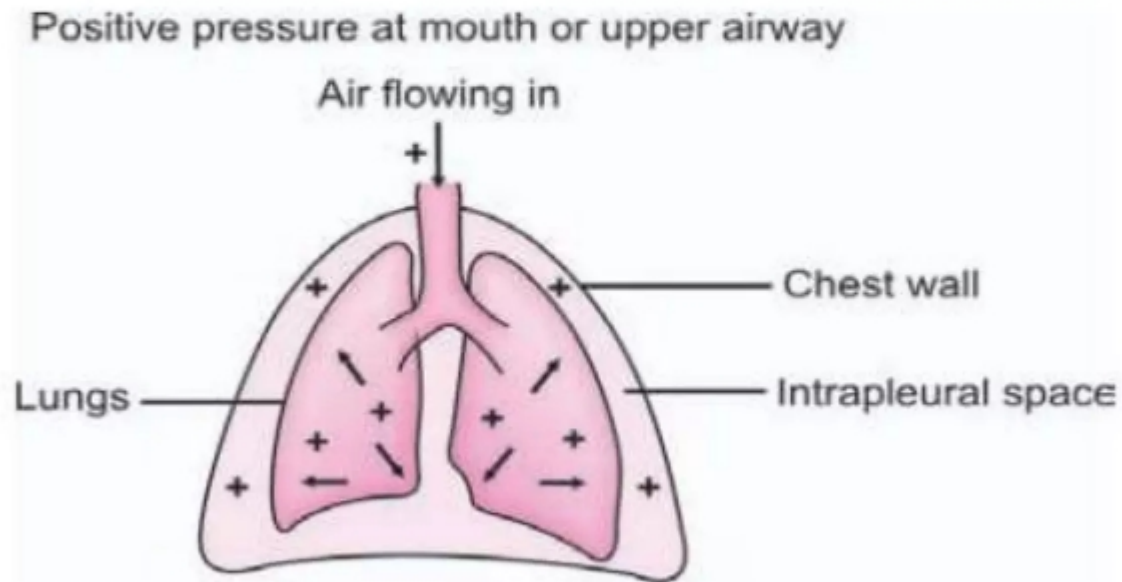


Fig. 6.4: Positive pressure inspiration

- ❖ Note that all the pressures, airway pressure, alveolar pressure and the intrapleural pressure have become positive.

Mechanism Of Positive Ventilators

Inflate the lungs by exerting positive pressure on the airway as compared to atmospheric pressure



Forcing the alveoli to expand during the inspiration



Allows the air to flows in the lungs



& Expiration occurs passively

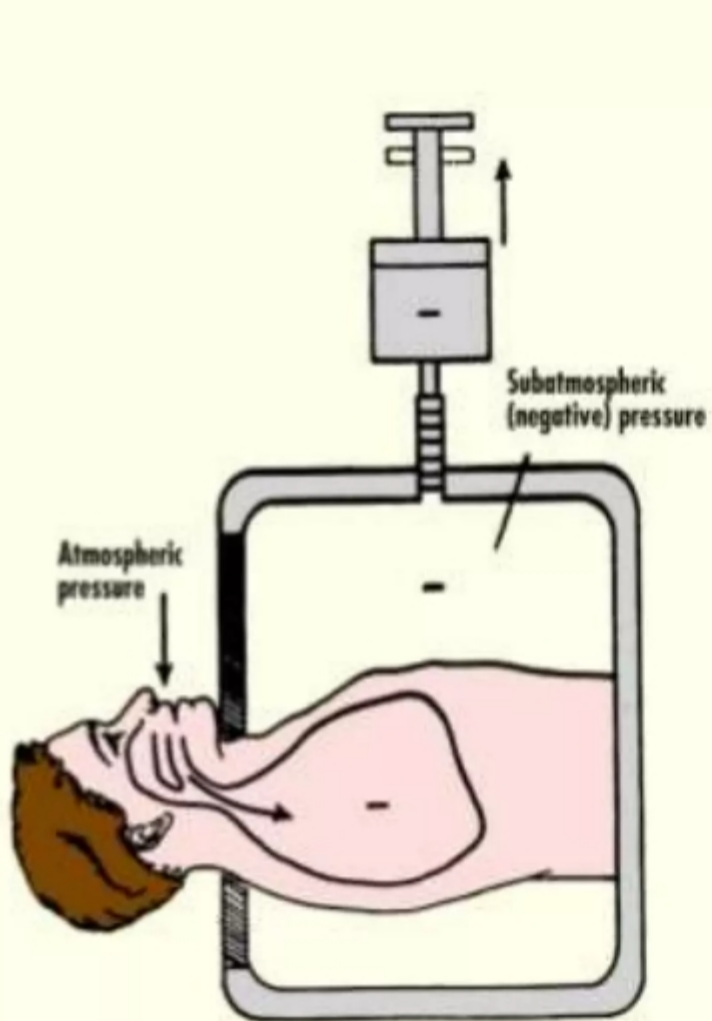


FIGURE 8-1 By applying subatmospheric pressure around the chest wall you can produce a drop in pressure in the airway and gas flow into the lungs.

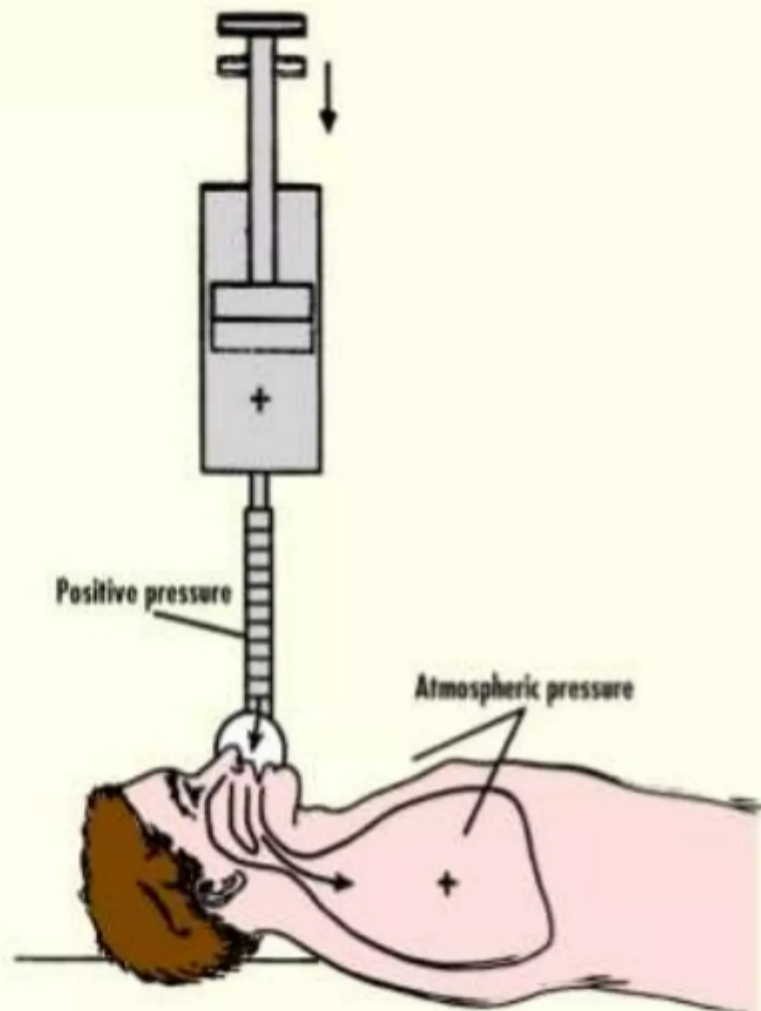


FIGURE 8-2 Application of positive pressure at the airway provides a pressure gradient and therefore gas flows into the lungs.

Classification of Positive Pressure Ventilation

1. Volume controlled

- Deliver a preset tidal volume
- Allows pressure to vary with changes in resistance and compliance
- Volume delivery remains constant

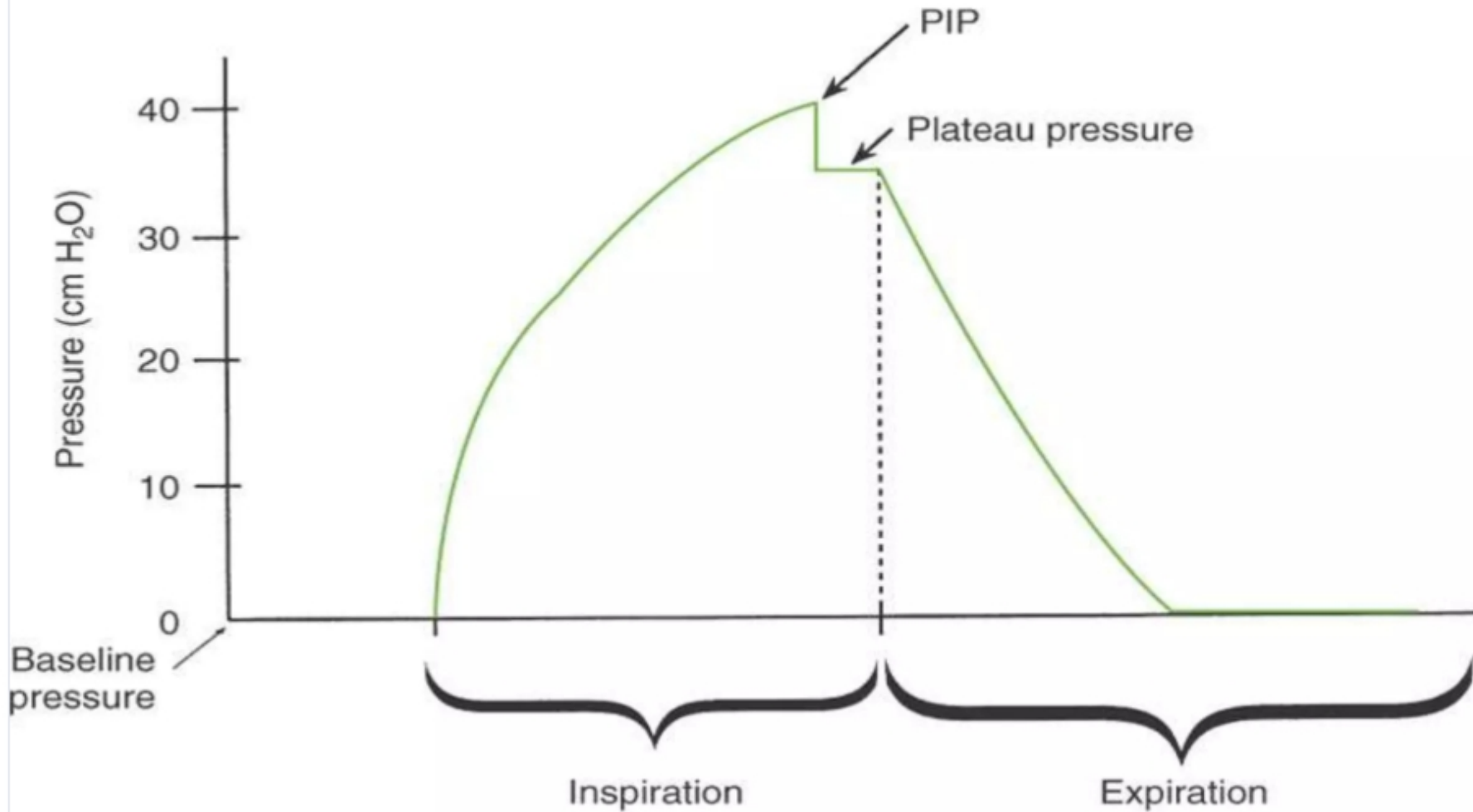
2. Pressure controlled

- Deliver a preset inspiratory pressure during each inspiration
- Volume delivery may vary

Pressure and Gradients

- Peak inspiratory pressure (P_{peak})
- Plateau pressure (P_{plateau})
- Baseline pressure
- Mean airway pressure (P_{mean})

Peak Pressure (P_{Peak})

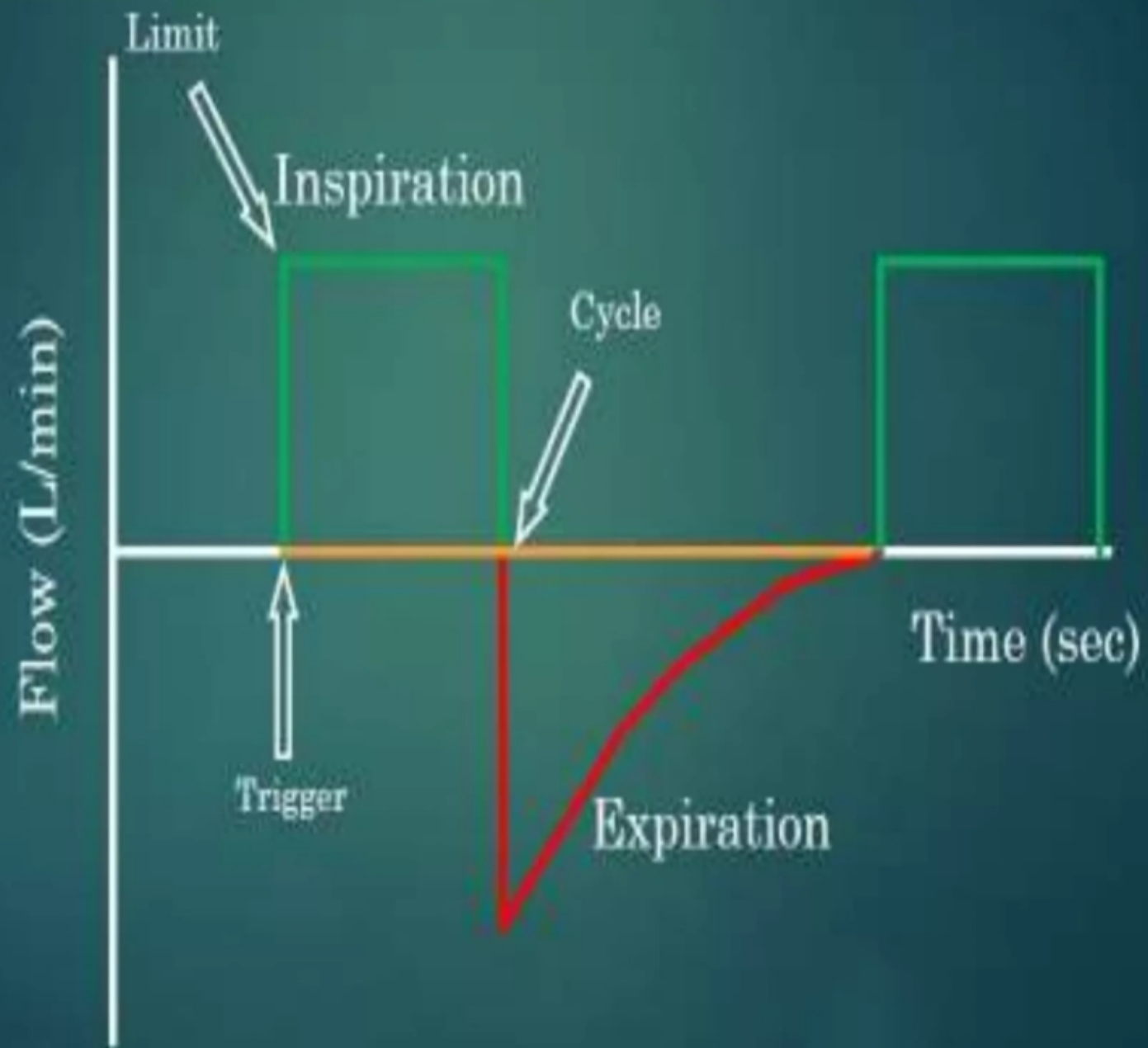


PHASES OF VENTILATORY CYCLES

1. TRIGGERING (Initiation of inspiration)
1. INSPIRATION
2. CYCLING (Change over from inspiration to expiration)
3. EXPIRATION

CONTROL VARIABLE

1. PRESSURE (cm H₂O)
2. FLOW (L/min)
3. VOLUME (ml)
4. TIME (sec)



Modes of Mechanical Ventilation

Selection of Modes of Ventilation

Regardless of which operating mode is selected, it should achieve four main goals:

- Provide adequate ventilation and oxygenation.
- Avoid ventilator-induced lung injury.
- Provide patient-ventilator synchrony.
- Allow successful weaning from mechanical ventilation.

Modes

- **Continuous mandatory mode**
 - Control (CMV)
 - Assist control (AC)
- **Intermittent Mandatory mode**
 - IMV (Intermittent Mandatory Ventilation)
 - SIMV (synchronized Intermittent Mandatory Ventilation)
- **Spontaneous mode**
 - Continuous Positive Airway Pressure (CPAP)
 - BiLevel Positive Airway Pressure (BiPAP)

Controlled Mandatory Ventilation (CMV)

- The ventilator initiates and controls both the volume delivered and the frequency of breaths. Patient cannot trigger ventilation. Patient should be sedated and possibly paralyzed.
- This mode is used for the patient who is unable to initiate breath.
- Not often used in ICU as it does not allow any synchronisation with the patient's own breathing

Contd...

Advantages

- Guaranteed volume(or pressure) with each breath
- Low patient workload

Disadvantages

- Spontaneous breath not allowed
- Needs deep sedation & Paralysis
- Apnea & Hypoxia if accidentally disconnected
- Ventilator dependence

Any questions?

*Thank
You*