ADEQUATE ALVEOLAR VENTILATION
From Emergency Medicine and Trauma/Critical Care Medicine

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KIMS, Nkp
Purpose of Ventilation of Alveoli is for better Oxygenation and maintain Eucapnea
Not only ADEQUATE ALVEOLAR VENTILATION
GOAL

- Oxygenation
- Eucapnea
- Stable hemodynamics

Alveolar Capillary Network

Gas Exchange
Introduction

Mechanical ventilation is usually applied through a endotracheal tube or a tracheotomy.
Respiratory distress who require respiratory support. Different way of Respiratory support.
Case details x 3
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Respiratory support

- Ventilation (mechanical)
- Oxygen therapy
- Invasive ventilation
- Non-invasive ventilation

Discussion: Dr. P. V. Sai S. N., H. O. D./Prof. (EMD.T)
A. Artificial respiration

1 Positive-pressure respiration
Polio epidemic

2 Negative-pressure respiration

Negative-pressure tank (iron lung)
3 Mouth-to-mouth resuscitation
Multiple factors do play vital role for better outcome.
RESPIRATORY SUPPORT

CLINICAL CONDITIONS REQUIRING MECHANICAL VENTILATION:

1. POST-OPERATIVE
2. RESPIRATORY FAILURE TYPE 2
3. CIRCULATORY FAILURE
4. NEUROLOGIC DISEASE
5. MULTIPLE TRAUMA
6. Other conditions of respiratory distress
INDICATIONS FOR TRACHEAL INTUBATION
AND
MECHANICAL VENTILATION

1. PROTECTION OF AIRWAY
2. REMOVAL OF SECRETIONS
3. HYPOXAEMIA (PaO2 <8kPa, SpO2 <90% DESPITE CPAP WITH FiO2 >0.6)
4. HYPERCAPNEA (IF GCS IS IMPAIRED OR RISK OF RAISED I.C.P)
5. VITAL CAPACITY FALL TO LESS THAN 1.2 LITRES esp. N.M. DISORDERS
6. EXHAUSTED PATIENT WITH INCREASED W.O.B
ARTIFICIAL VENTILATION
MECHANICAL VENTILATION

- Negative pressure type
- Positive pressure type
  (invasive ventilation)

Non-invasive ventilation
Unwanted effects/disadvantages of Invasive ventilation

1. Paralyse the muscles of respi.
2. Ventilator induced pneumonia
3. Pulmonary effects
4. Cardiovascular side effects
5. Weaning difficulty
With the introduction of nasal CPAP to treat obstructive sleep apnea in the early 1980s, NIPPV rapidly displaced negative-pressure ventilation as the treatment of choice for chronic respiratory failure in patients with neuromuscular and chest wall deformities.
The past 12 years, noninvasive ventilation has moved from the outpatient to the inpatient setting, where it is used to treat acute respiratory failure.
ADEQUATE ALVEOLAR VENTILATION
• NPPV provides greater flexibility in initiating and removing mechanical ventilation

• Permits normal eating, drinking and communication with your patient
Put this small wonder to work for you.
• Preserves airway defense, speech, and swallowing mechanisms
• Avoids the trauma associated with intubation and the complications associated with artificial airways
• Reduces inspiratory muscle work and helps to avoid respiratory muscle fatigue that may lead to acute respiratory failure
• Provides ventilatory assistance with greater comfort, convenience and less cost than invasive ventilation
• Reduces requirements for **heavy sedation**
• Reduces need for **invasive monitoring**
Can we avoid to prevent?
• Reduces the risk of ventilator associated pneumonia (VAP)
• Reduces the risk of ventilator induced lung injury associated with high ventilating pressures
Multi organ dysfunction
You are Successful partially.

Ventilation

✓ Invasive
✓ Non-invasive
It appears that you are 100% Successful but ????
Many Disadvantages of invasive ventilation

Many advantages of Non-invasive ventilation

An attempt is made to improve the status
Carbon dioxide diffuses from the bloodstream to alveolus.
Types of NIV

Positive pressure ventilation
- BIPAP
- CPAP

Negative pressure ventilation
- (iron or tank-chest cuirass)

Abdominal Displacement
- (Pneumobelt-Rocking bed)

Positive pressure ventilation
- BIPAP
- CPAP
Normal respiration
Non-invasive ventilation

**INDICATIONS**

- Fully conscious
- Intact oro-phyn–laryn. reflexes
- Empty stomach
- Able to hold the breath
- Respiratory rate < 30/minute
- Respiratory disease condition
- Able to tolerate the mask
Contraindications

- Cardiac or respiratory arrest
- Nonrespiratory organ failure
- Severe encephalopathy (eg, GCS <10)
- Severe upper gastrointestinal bleeding
- Hemodynamic instability or unstable cardiac arrhythmia
contraindications

• Facial or neurological surgery, trauma, or deformity
• Upper airway obstruction
• Inability to cooperate/protect airway
• Inability to clear secretions
• High risk for aspiration
Success established
ADEQUATE ALVEOLAR VENTILATION
Inspiration.

Expiration.
INDICATED TO:
1. AIRWAY PATENCY
2. CORRECT HYPOXIAEMIA
3. CORRECT HYPERCAPNOEA
4. REDUCE WORK OF BREATHING
RESPIRATORY SUPPORT

NON-INVASIVE VENTILATION:
1. FACE MASK
2. NASAL CANNULAE
3. CPAP
4. BiPAP
5. NIPPV

CONSIDERATIONS:
1. TYPE OF RESP. FAILURE
2. STATUS OF F.R.C
3. LUNG COMPLIANCE
4. W.O.B

3/29/2014
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CO = 5 L
RESPIRATORY SUPPORT

OXYGEN THERAPY:
  - NIV/INVASIVE.
  - FASE MASK
  - CPAP
  - BIPAP
  - NIPPV

1. WHICH PATIENT GETS THE BENEFIT?
2. HOW LONG THE PATIENT NEEDS?
3. WHICH PARAMETERS DECIDE THE REQUIREMENT?
Support during
✓ Inspiration
✓ expiration
The Pear + The Cone = The Wave

Inhale

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Diaphragm

Foundation: Pelvis and Relaxed Perineum (between sit bones)
Art of Weaning from Mechanical ventilation
Now you can tell others also the safety
Clinical trials have shown that in specific clinical situations there is a significant improvement in patient outcomes when endotracheal intubation can be avoided.
1) acute COPD exacerbation,
2) acute cardiogenic pulmonary edema.
3) postoperative respiratory failure.
and
4) respiratory failure in immunocompromised patients
D: Middle Forced Expiration
NORMAL LUNG

E: Mild Forced Expiration
EMPHYSEMA

F: Mild Forced Expiration
EMPHYSEMA
LARYNX PARTLY CLOSED
In other clinical situations of respiratory distress, noninvasive ventilation should be applied with caution.
Its use as a *weaning technique* in “difficult to wean” COPD patients when the standard criteria for spontaneous breathing *were not met*. 
There are too few studies available to establish a place for noninvasive ventilation in acute asthma, upper airway obstruction, and trauma.
Predictors of success for noninvasive ventilation include **younger age**, **lower acuity** of illness as quantified by the [APACHE II] or [SAPS] (Simplified Acute Physiology Score). II score).
Ability of the patient to cooperate, intact dentition, technical ability to minimize air leaks, moderate hypercapnia (i.e., between 45 and 90 mm Hg), and moderate acidosis (i.e., pH between 7.35 and 7.10).
“Thaks very much”


