



UNIT-3 ARTIFICIAL RESPIRATION, AND RESUSCITATION METHODS

ARTIFICIAL RESPIRATION

Any measure that causes air to flow in and out of the lungs when natural breathing is inadequate or ceases, as in respiratory paralysis, drowning, electric shock, choking, gas or smoke inhalation or poisoning.

CONDITIONS WHEN ARTIFICIAL RESPIRATION IS REQUIRED

Artificial respiration is required whenever there is an arrest of breathing, without cardiac failure. Arrest of breathing occurs in the following conditions:

- 1. Accidents
- 2. Drowning
- 3. Gas poisoning
- 4. Electric shock
- 5. Anesthesia.

Stoppage of **oxygen supply for 5 minutes** causes irreversible changes in tissues of brain, particularly tissues of cerebral cortex. So, artificial respiration (resuscitation) must be started quickly without any delay, before the development of cardiac failure. Purpose of artificial respiration is to ventilate the alveoli and to stimulate the respiratory centers.

METHODS OF ARTIFICIAL RESPIRATION

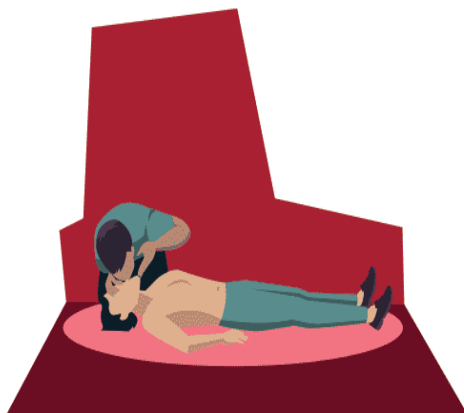
They are of 2 methods ,they are

- Manual methods
- Mechanical methods

MANUAL METHODS

- Manual methods of **resuscitation** can be applied quickly without waiting for the availability of any mechanical aids.
- Affected person must be provided with clear air.
- Clothes around neck and chest regions must be loosened.
- Mouth, face and throat should be cleared of mucus, saliva, foreign particles, etc.
- Tongue must be drawn forward and it must be prevented from falling posteriorly, which may cause airway obstruction.
- Manual methods are of 2 types, they are
 1. Mouth-to-mouth method
 2. Prone pressure method

1. Mouth to mouth method



Supine



Prone



- It is a direct and best method of artificial respiration.

- The subject is kept in supine position and the **resuscitator** (person who give resuscitation) kneels at the side of the subject.
- By keeping the thumb on subject's mouth, the lower jaw is pulled downwards.
- Nostrils of the subject are closed with thumb and index finger of the other hand.
- Resuscitator then takes a deep breath and exhales into the subject's mouth forcefully.
- Volume of exhaled air must be twice the normal tidal volume. This expands the subject's lungs.
- Then, the resuscitator removes his mouth from that of the subject.
- After that a passive expiration occurs in the subject due to elastic recoil of the lungs.
- This procedure is repeated at a rate of 12 to 14 times a minute, till normal respiration is restored.

Advantage and Disadvantage: Mouth to mouth method

Advantages :

- The subject is given exhaled air containing carbon dioxide, which stimulates the respiratory centre and facilitates the onset of respiration.
- It is the best method of artificial respiration for newborns.

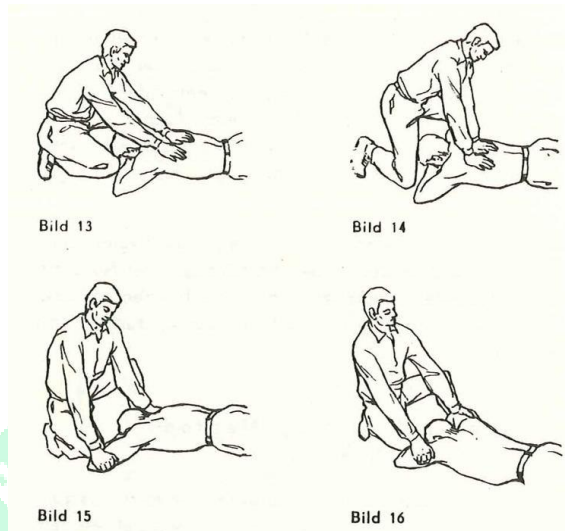
Disadvantages:

- The close contact between the mouths of resuscitator and subject may not be acceptable for various reasons.

2. Holger Nielsen Method or Back Pressure Arm Lift Method

- In this method the subject is placed in prone position with head turned to one side.
- Hands are placed under the cheeks with flexion at elbow joint and abduction of arms at the shoulders.
- Resuscitator kneels beside the head of the subject.

- By placing the palm of the hands over the back of the subject, the resuscitator bends forward with straight arms (without flexion at elbow) and applies pressure on the back of the subject.



- Weight of the resuscitator and pressure on back of the subject compresses his chest and expels air from the lungs. Later, the resuscitator leans back.
- At the same time, he draws the subject's arm forward by holding it just above elbow.
- This procedure causes expansion of thoracic cage and flow of air into the lungs.
- The movements are repeated at the rate of 12 per minute, till the normal respiration is restored.

Mechanical methods

- Mechanical methods of artificial respiration become necessary when the subject needs artificial respiration for long periods.
- It is essential during the respiratory failure due to paralysis of respiratory muscles or any other cause.
- Mechanical methods are of two types:

i. Drinker method

ii. Ventilation method

Drinker Method

- The machine used in this method is called **iron lung chamber** or **tank respirator**.
- The equipment has an airtight chamber, made of iron or steel.
- The Subject is placed inside this chamber with the head outside the chamber.
- By means of some pumps, the pressure inside the chamber is made positive and
- negative alternately.

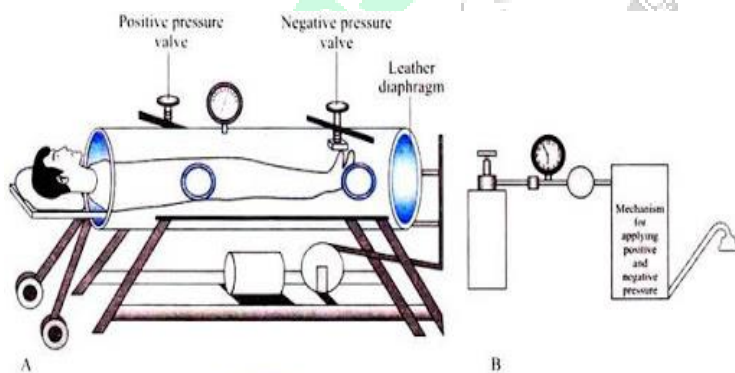


Fig. 8.48 (A) Tank respirator (B) Resuscitator



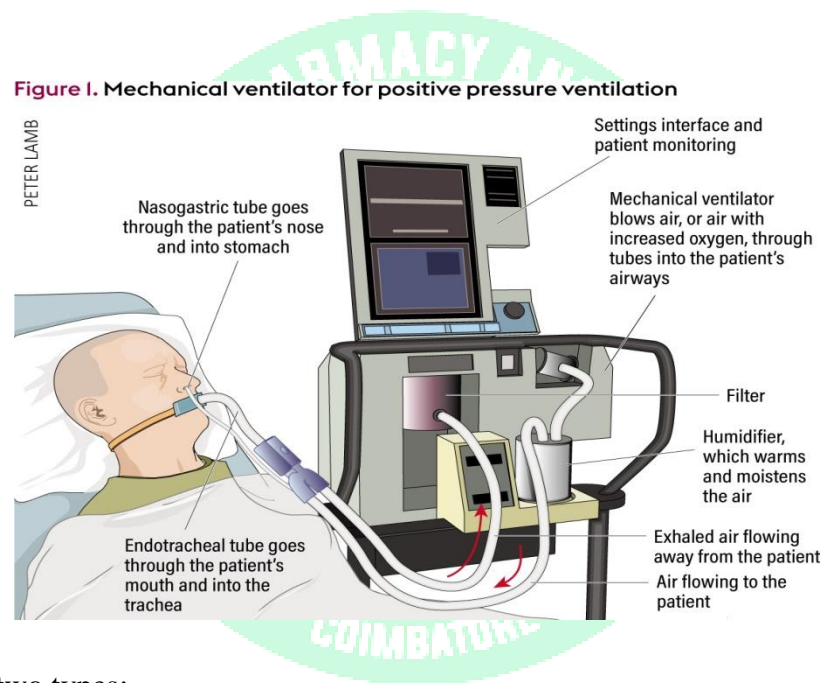
- During the negative pressure in the chamber, the subject's thoracic cage expands and inspiration occurs and during positive pressure the expiration occurs.

Advantage

- By using tank respirator, the patient can survive for a longer time, even up to the period of one year till the natural respiratory functions are restored.

Ventilation Method

- A rubber tube is introduced into the trachea of the patient through the mouth.
- By using a pump, air or oxygen is pumped into the lungs with pressure intermittently.
- When air is pumped, inflation of lungs and inspiration occur.
- When it is stopped, expiration occurs and the cycle is repeated.
- Apparatus used for ventilation is called **ventilator** and it is mostly used to treat acute respiratory failure.



Ventilator is of two types:

1. Volume ventilator

By volume ventilator, a constant volume of air is pumped into the lungs of patients intermittently with minimum pressure.

2. Pressure ventilator

By pressure ventilator, air is pumped into the lungs of subject with constant high pressure.

RESUSCITATION



- **Resuscitation** is the process of correcting physiological disorders (such as lack of breathing or heartbeat) in an acutely ill patient. It is an important part of intensive care medicine, trauma surgery and emergency medicine.
- Cardio pulmonary resuscitation (CPR) is a procedure used when a patient's heart stops beating and breathing stops. It can involve compressions of the chest or electrical shocks along with rescue breathing.

Principles of CPR

- To restore effective circulation and ventilation.
- To prevent irreversible cerebral damage due to anoxia. When the heart fails to maintain the cerebral circulation for approximately 4 minutes the brain may suffer irreversible damage.

Indications of CPR

- Cardio vascular disorders
- Pulmonary causes
- Metabolic causes
- Fluid imbalance
- Neurological causes
- Drug overdose

Warning signs of cardio pulmonary arrest

- Early signs
- Loss of consciousness and convulsion
- Late signs
- Apnoea, dilated pupils, absence of heart sounds
- Other signs
- Changes in respiratory rate, a weak or irregular pulse, bradycardia, cyanosis, hypothermia

TECHNIQUE



CPR comprises the following 3 steps, performed in order:

- Chest compressions
- Airway
- Breathing

Positioning for CPR is as follows:

- CPR is most easily and effectively performed by laying the patient supine on a relatively hard surface, which allows effective compression of the sternum

- Delivery of CPR on a mattress or other soft material is generally less effective
- The person giving compressions should be positioned high enough above the patient to achieve sufficient leverage, so that he or she can use body weight to adequately compress the chest

For an unconscious adult, CPR is initiated as follows:

- Give 30 chest compressions
- Perform the head-tilt chin-lift maneuver to open the airway and determine if the patient is breathing
- Before beginning ventilations, look in the patient's mouth for a foreign body blocking the airway

Chest compression

The provider should do the following:

- Place the heel of one hand on the patient's sternum and the other hand on top of the first, fingers interlaced
- Extend the elbows and the provider leans directly over the patient
- Press down, compressing the chest at least 2 in
- Release the chest and allow it to recoil completely
- The compression depth for adults should be at least 2 inches (instead of up to 2 inches, as in the past)



- The compression rate should be at least 100/min
- The key phrase for chest compression is, “Push hard and fast”
- Untrained bystanders should perform chest compression—only CPR (CO CPR)
- After 30 compressions, 2 breaths are given; however, an intubated patient should receive continuous compressions while ventilations are given 8-10 times per minute
- This entire process is repeated until a pulse returns or the patient is transferred to definitive care
- To prevent provider fatigue or injury, new providers should intervene every 2-3 minutes (ie, providers should swap out, giving the chest compressor a rest while another rescuer continues CPR)

Ventilation:

- If the patient is not breathing, 2 ventilations are given via the provider’s mouth or a bag-valve mask (BVM).
- If available, a barrier device (pocket mask or face shield) should be used.

