Artificial Respiration

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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

- Methods of artificial respiration are of two types:

1. Manual methods
2. 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 two types:

i. Mouth-to-mouth method

ii. Holger Nielsen method.

Mouth-to-mouth Method

- 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. Now, 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.

- Mouth-to-mouth method is the most effective manual method because, carbon dioxide in expired air of the resuscitator can directly stimulate the respiratory centers and facilitate the onset of respiration. Only disadvantage is that the close contact between the mouths of resuscitator and subject may not be acceptable for various reasons.

Holger Nielsen Method or Back Pressure Arm Lift Method

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

- a. Volume ventilator
- b. Pressure ventilator.

Volume ventilator

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

Pressure ventilator

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