Positive Airway Pressure Therapy for Obstructive Sleep Apnea

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Abstract:

A continuous positive airway pressure (CPAP) machine is the most commonly prescribed device for treating sleep apnea disorders.

Obstructive sleep apnea (OSA) causes interruptions or pauses in your breathing, often because your throat or airways briefly collapse or something temporarily blocks them.

Introduction :

As airway muscles relax during sleep, the airway can become partially obstructed. This can lead to lower blood oxygenation and cause awakening or arousal from deep sleep. Maintaining positive air pressure by supplying a continuous source of compressed air so that using Continuous positive airway pressure (CPAP).

CPAP: is a type of respiratory ventilation originally developed for combating sleep apnea, which remains its primary use. It is also useful in providing ventilation for newborns and anyone suffering respiratory failure **[1].** More research is revealing the benefits of continuous positive airway pressure (CPAP) in reducing the likelihood of hospitalization for coronavirus, which reduces the burden for hospitals experiencing a shortage of available beds. CPAP is also minimizing the

need for ventilators for some COVID-19 patients who have been hospitalized, which allows those essential ventilators to be made more accessible for more serious coronaviruses cases **[2].**

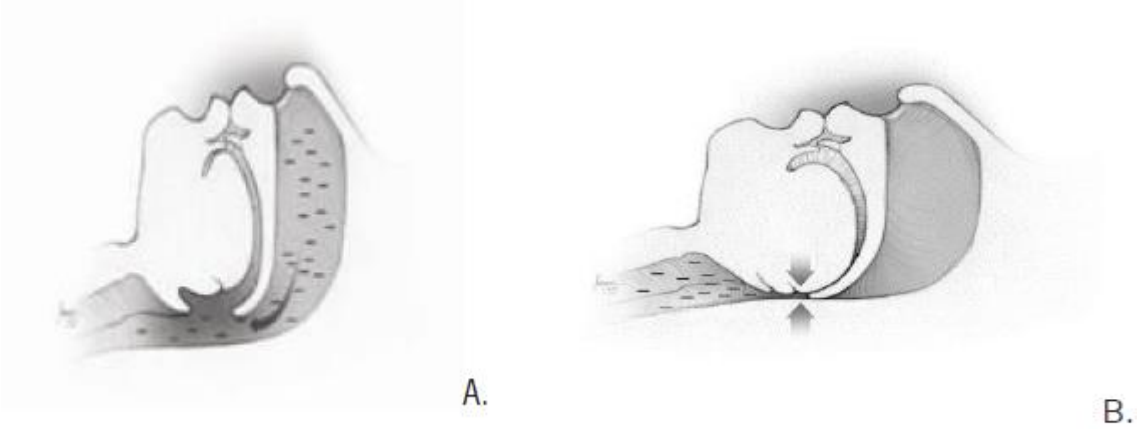
What is Obstructive sleep apnea?

Obstructive sleep apnea (OSA): OSA occurs when the airway at the back of the throat becomes physically blocked. That obstruction causes temporary lapses in breath.

Who gets sleep apnea?

Sleep apnea occurs in about 25 percent of men and 10 percent of women. Sleep apnea can affect people of all ages, including babies and children but is particularly common in people over the age of forty and those who are overweight.

The figures below illustrate the upper airway in normal sleep: (A) person is lying on back, face up, and (B) in OSA. The arrows indicate complete obstruction in the back of the throat.



A. B.

What are the symptoms of sleep apnea?

- Snoring.
- Daytime sleepiness or fatigue.
- Sudden awakenings with a sensation of gasping or Choking.
- Dry mouth or sore throat upon awakening.
- Headaches.

What are the effects of sleep apnea?

If left untreated, sleep apnea can result in a number of health problems including hypertension, stroke, arrhythmias,

cardiomyopathy (enlargement of the muscle tissue of the heart), heart failure, diabetes, and heart attacks.

What are the treatments for sleep apnea?

Mechanical therapy: Continuous Positive Airway Pressure (CPAP) is the preferred initial treatment for most people with OSA. With CPAP, patients wear a mask over their nose and/or mouth and air blower forces air through the airway. The air pressure is adjusted so that it is just enough to prevent the upper airway tissues from collapsing during sleep. The pressure is constant and continuous. CPAP prevents airway closure while in use, but apnea episodes return when CPAP is stopped or it is used improperly **[3].**

CPAP Machines

Continuous passive airway pressure (CPAP) Machines gently blow pressurized air through your airway at a constant pressure to prevent the throat muscles from collapsing into the airway.

CPAP Machine Parts:

CPAP Machines are very basic, easy to use, and are composed of three major parts:

1. **CPAP Motor:**

   Is small compressor it draws in room temperature air and pressurized it to deliver the perfect amount of air pressure that the patient.

2. **CPAP Hoses:**

   the hoses are simply the delivery device that transports the pressurized air from the motor to the wearer's mask.

3. **CPAP Mask:**

CPAP masks come in all shapes and sizes to suit all people.

There are three types of masks:

- Nasal pillows
- Nasal masks
- Full face masks

Block diagram of CPAP Mechanism :

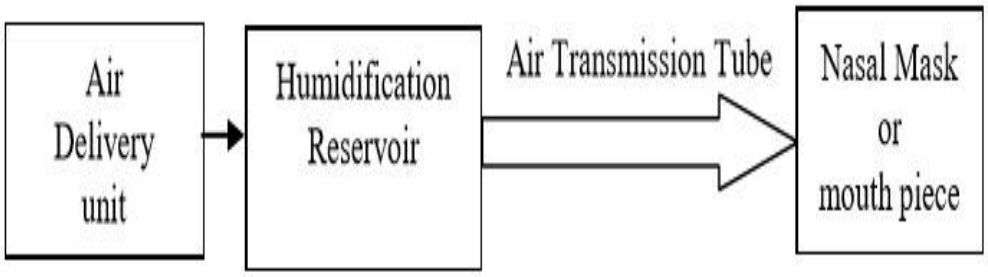
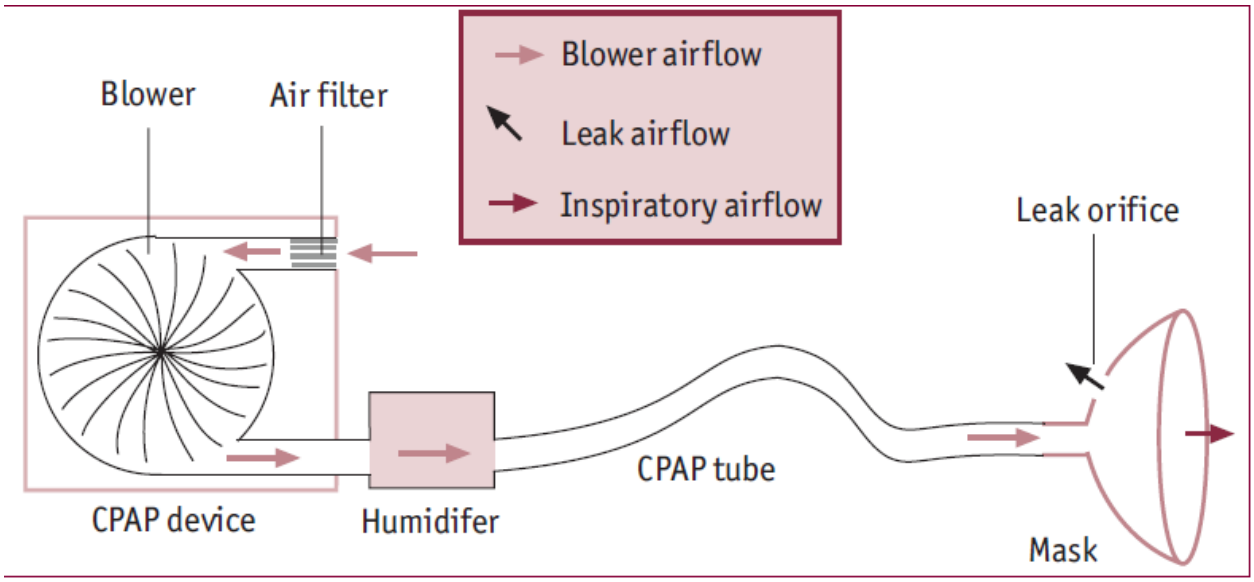


Diagram of a conventional CPAP system.



How does a CPAP machine work?

A CPAP machine's compressor (motor) generates a continuous stream of pressurized air that travels through an air filter into a flexible tube. This tube delivers purified air into a mask that's sealed around your nose or mouth. As you sleep, the airstream from the CPAP machine pushes against any blockages, opening your airways so your lungs receive plenty of oxygen. Without anything obstructing this flow of oxygen, your breathing doesn't pause. As a result, you don't repeatedly wake up in order to resume breathing **[4].**

References:

1. John Gosson , May 10, 2010 , How Continuous Positive Airway Pressure (CPAP) Respiratory Ventilation Systems Function.
2. Jose Acosta , May 27, 2020 , How CPAP Machines Are Used for Coronavirus Treatment.
3. The Cleveland Clinic Guide to Sleep Disorders by Nancy Foldvary-Schaefer, Dos.
4. Medically reviewed by Raj Dasgupta, MD — Written by Rebecca Joy Stanborough, MFA on August 18, 2020 https://www.healthline.com/health/what-is-a-cpap-machine?fbclid=IwAR004D6Gl4mTRz7RduYmukB6WsNCDxFAMJOtLYxpoY_zfgXBv4z6PQJDGsc