

Cardiorespiratory Disorders and Treatment

Suman Pathak

Assam Down Town University, Panikhaiti, Guwahati 781026, India

Email: [physiosuman42\[at\]gmail.com](mailto:physiosuman42[at]gmail.com)

Abstract: *The term cardiovascular disease refers to any disorder of the heart and blood vessels, including hypertension, coronary artery disease (CAD), cardiac dysrhythmias, cerebrovascular disease, valvular heart disease, cardiomyopathies, peripheral vascular disease, and congenital cardiac abnormalities.*

Keywords: Cardiovascular Disease, COPD, Coronary Heart disease, Heart Transplantation, Respiratory disease, Psychosocial factor

1. Introduction

Before start with the disease and disorders it would be important to briefly describe the function of respiratory anatomy system.

Respiratory system is divided into upper and lower respiratory tract. Trachea is considered to be the point of division while the upper respiratory tract is composed of the nostrils, nasal passages following pharynx, than larynx and terminates at the upper part of the trachea. The lower respiratory tract begins at the lower part of the trachea, which is followed by pharynx, than larynx and terminates at the upper part of the trachea.

2. Mechanics of Breathing

The Lung cavity is protected by the rib cage. A sheet of muscle called the diaphragm serves other parts of the respiratory system, such as the trachea, or windpipe, and bronchi, conduct air to the lungs. While the pleural membranes, and the pleural fluid, allow the lungs to move smoothly within the cavity. The process of breathing, or respiration, is divided into two distinct phases.

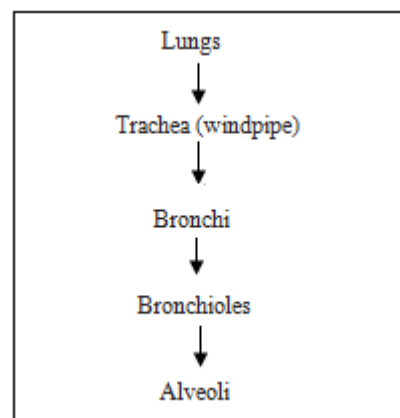
The first phase is called inspiration, or inhaling. When the lungs inhale, the diaphragm contracts and pulls downward. At the same time, the muscles between the ribs contract and pull upward. This increases the size of the thoracic cavity and decreases the pressure inside. As a result, air rushes in and fills the lungs. The second phase is called expiration, or exhaling. When the lungs exhale, the diaphragm relaxes, and

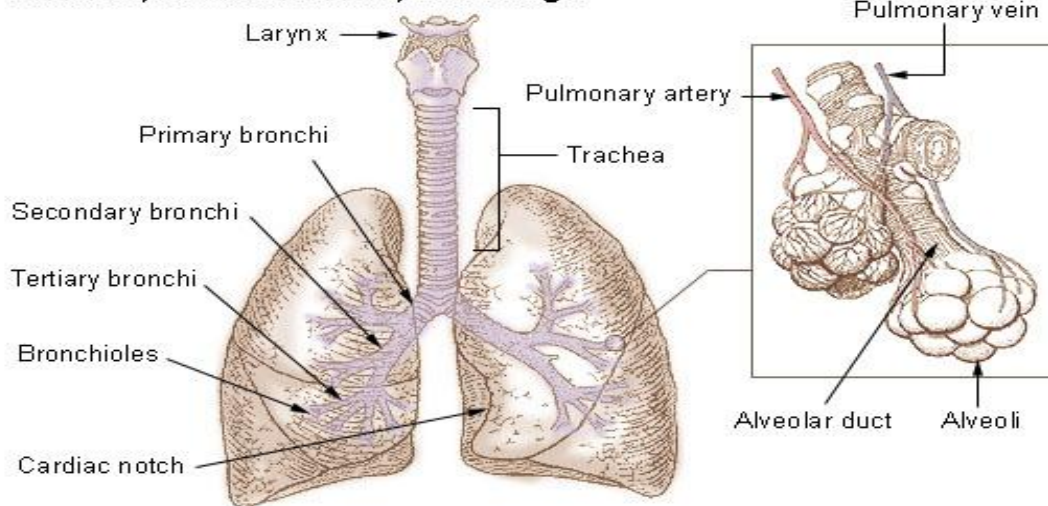
the volume of the thoracic cavity decreases, while the pressure within it increases. As a result, the lungs contract and air is forced out.

The upper respiratory tract includes the:

- **Mouth and nose.** Air enters and leaves the lungs through the mouth and nostrils of the nose.
- **Nasal cavity.** Air passes from the nose into the nasal cavity, and then the lungs.
- **Throat (pharynx).** Air from the mouth is sent to the lungs via ththe throat.
- **Voice box (larynx).** This part of the throat helps air to pass into the lungs and keeps out food and drink.

The lower respiratory tract is made up of the:



Bronchi, Bronchial Tree, and Lungs

Alveoli is covered with a layer known as Capillary which used to help in oxygen exchange with blood.

3. Muscles of Respiration

There are a group of a muscles which assist in carrying out complete process of respiration. During quiet breathing muscle in action is the Diaphragm and partly the intercostals muscle, When a person forcefully inspires the Sternomastoid, scaleni, Serratus anterior, Pectoralis minor and Erector spinae.

4. Common Pulmonary Conditions

After a detailed overview of the respiratory system, it would be appropriate to discuss the various pulmonary conditions. Pulmonary Conditions are mainly Classified as

1) Obstructive Pulmonary Disease: Obstructive pulmonary disease (COPD) is a common lung disease causing Obstruction of airflow and breathing problems. Excessive mucus coats the bronchial walls and clogs the bronchioles. Eventually they may occupy as much as two thirds of the wall thickness. This causes a chronic inflammatory process which results in mucosal oedema, thus further adding on to decreased diameter of the airways. Some name of the Obstructive airway disease:

- COPD
 - Chronic Bronchitis
 - Emphysema
- Asthma
- Bronchiectasis
- Cystic Fibrosis
- Bronchiolitis

a) COPD: COPD is an umbrella term for a range of progressive lung diseases. Chronic bronchitis and emphysema can both result in COPD. Chronic bronchitis irritates your bronchial tubes, which carry air to and from your lungs. In response, the tubes swell and mucus (phlegm or “snot”) builds up along the lining. The buildup narrows the tube’s opening, making it hard to get air into and out of your lungs.

b) Emphysema is the breakdown of the walls of the tiny air sacs (alveoli) at the end of the bronchial tubes, in the “bottom” of your lung. Your lung is like an upside - down tree. The trunk is the windpipe or “trachea, ” the branches are the “bronchi, ” and the leaves are the air sacs or “alveoli. ”

c) Asthma: Asthma is marked by inflammation of the bronchial tubes, with extra sticky secretions inside the tubes. People with asthma have symptoms when the airways tighten, inflame, or fill with mucus.

d) Bronchiectasis: Bronchiectasis is a condition that occurs when the tubes that carry air in and out of your lungs get damaged, causing them to widen and become loose and scarred. These tubes are called airways.

e) Bronchiectasis usually results from an infection or other condition that injures the walls of your airways or prevents the airways themselves from clearing mucus. Mucus is a slimy substance that the airways produce to help remove inhaled dust, bacteria, and other small particles.

f) Cystic Fibrosis: Cystic fibrosis (CF) is a genetic condition that affects Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) protein in the body. People who have cystic fibrosis have a faulty protein that affects the body’s cells, tissues, and the glands that make mucus and sweat.

Mucus is normally slippery and protects the linings of the airways, digestive tract, and other organs and tissues. People who have cystic fibrosis make thick, sticky mucus that can build up and lead to blockages, damage, or infections in the affected organs. Inflammation also causes damage to organs such as the lungs and pancreas.

2) Restrictive Pulmonary Disease: Restrictive lung disease, a decrease in the total volume of air that the lungs are able to hold, is often due to a decrease in the elasticity of the lungs themselves or caused by a problem related to the expansion of the chest wall during inhalation. Restrictive diseases stop the lungs from fully expanding. This limits the volume of air and amount of oxygen that a person breathes in. To meet the body’s oxygen needs, the person’s breathing rate often increases.

Some name of the Restrictive airway disease:

- Asbestosis
 - Sarcoidosis
 - Pulmonary fibrosis
 - Interstitial lung disease
 - Pulmonary vasculitis
- a) Asbestosis: Asbestosis (as - bes - TOE - sis) is a chronic lung disease caused by inhaling asbestos fibers. Prolonged exposure to these fibers can cause lung tissue scarring and shortness of breath. Asbestosis symptoms can range from mild to severe, and usually don't appear until many years after initial exposure.
 - b) Sarcoidosis: - Sarcoidosis is an inflammatory disease that affects multiple organs in the body, but mostly the lungs and lymph glands. In people with sarcoidosis, abnormal masses or nodules (called granulomas) consisting of inflamed tissues form in certain organs of the body. These granulomas may alter the normal structure and possibly the function of the affected organ (s).
 - c) Pulmonary Fibrosis: - Pulmonary fibrosis is a lung disease that occurs when lung tissue becomes damaged and scarred. This thickened, stiff tissue makes it more difficult for your lungs to work properly. As pulmonary fibrosis worsens, you become progressively more short of breath.
 - d) The scarring associated with pulmonary fibrosis can be caused by a multitude of factors. But in most cases, doctors can't pinpoint what's causing the problem. When a cause can't be found, the condition is termed idiopathic pulmonary fibrosis.
 - e) Interstitial Lung disease: - Interstitial lung disease is an umbrella term used for a large group of diseases that cause scarring (fibrosis) of the lungs. The scarring causes stiffness in the lungs which makes it difficult to breathe and get oxygen to the bloodstream. Lung damage from ILDs is often irreversible and gets worse over time.
 - f) Pulmonary Vasculitis: Pulmonary vasculitis refers to vasculitides that affect the lung or pulmonary vessels.

5. Symptoms

Common symptoms for both OLD and RLD are

- Dyspnea (shortness of breath)
- Persistent cough
- Tachypnea (rapid respiratory rate)
- Anxiety
- Unintentional weight loss (due to the increased energy needed to breathe)

6. PT Management

In first stage *Airway Clearance Technique*'s need to apply to Clear the airway (mainly mucus). In this included

- Postural Drainage
- Chest Physiotherapy
 - Percussion
 - Vibration
- Active Cycle Breathing Techniques
- Autogenic Drainage
- Positive expiratory pressure therapy (PEP)
- Oscillating positive expiratory pressure or flutter PEP
- High - frequency chest wall oscillation

- 1) Postural Drainage: For this technique, patient lie down in certain positions (postures) so that gravity can help mucus drain from different segments of the lungs. Usually someone claps your chest, which is called percussion, to loosen and move mucus. This is done in different positions to drain all parts of your lungs.
- 2) Chest Physiotherapy: In Chest physiotherapy Percussion, Vibration and Shaking mainly used to loose the secretion from airways and huffing and cuffing used to clear the secretion from the lung.
- 3) Active Cycle Breathing Techniques: This technique combines gentle breathing, deep breathing, and huff coughs. This breathing in cycles to loosen and move mucus out of the lungs.
- 4) Autogenic Drainage: Autogenic drainage (AD) is an airway clearance technique which utilises controlled breathing at different lung volumes to loosen, mobilize and move secretions in three stages towards the larger central airways.
- 5) Positive expiratory pressure therapy (PEP): One of the most frequently prescribed airway clearance therapy (ACT) options for patients with chronic lung conditions or decreased lung volumes are positive expiratory pressure therapy (PEP) devices. It works like
 - Air get behind the mucus
 - Move mucus from lung and airway walls
 - To hold the airways open for longer.
- 6) Flutter PEP: This therapy provides the combination of positive expiratory pressure with high frequency oscillations. It involves breathing with a slightly active expiration against an expiratory resistance through the device. Which is used for Clearance of excess secretion from the lungs.
- 7) High - frequency chest wall oscillation: High - frequency chest wall oscillation involves an inflatable vest that is attached to a machine. The machine mechanically performs chest physical therapy by vibrating at a high frequency. The vest vibrates the chest to loosen and thin mucus. Every five minutes, the person stops the machine and coughs or huffs.

In Text -

Paraphrasing: A few words “, 2019 - 2023

References

- [1] Myocardial infarction as a chance for life. Daniel Broschmann & Christoph Herrmann - Lingen - 2023 - Ethik in der Medizin 35 (1): 57 - 75.
- [2] Cardiovascular, Respiratory, and Related Disorders: Key Messages and Essential Interventions to Address Their Burden in Low - and Middle - Income Countries Dorairaj Prabhakaran, Shuchi Anand, David A Watkins, Thomas A Gaziano, Yangfeng Wu, Jean - Claude Mbanya, and Rachel Nugent.
- [3] Relationships among Major Risk Factors and the Burden of Cardiovascular Diseases, Diabetes, and Chronic Lung Disease Vamadevan S Ajay, David A Watkins, and Dorairaj Prabhakaran.
- [4] Abelson, J., Weg, J., Nesse, R., et al. (2001). Persistent respiratory irregularity in patients with panic disorder. *Biological Psychiatry*, 49, 588-95. Google Schola

- [5] Alloway, R. (1987). The buffer theory of social support; a review of the literature. *Psychological Medicine*, 17, 91–108. Google Scholar
- [6] Bosma, H., Marmot, M., Hemingway, H., et al. (1997). Low job control and risk of coronary heart disease in the Whitehall II (prospective cohort) study. *British Medical Journal*, 314, 588–65. Google Scholar
- [7] Guire, S., Gervitz, R., Hawkinson, D., et al. (1996). Breathing retraining: a three year follow up study of treatment for hyperventilation syndrome and associated functional cardiac symptoms. *Biofeedback and Self Regulation*, 21, 191–8. Google Scholar