

## Chronic obstructive airway disease: A short notes

Blessy Bronson\*

### Abstract

People round the globe are now suffering with the different types of lung infections with the increase of the pollution in the environment. Chronic Obstructive Airway Disease (COAD) is one of the most common diseases seen mainly in these recent days with the effect of COVID-19 pandemic. The severity of this disease varies from person to person with the age, time and immune system. The types of the COAD, their causative aspects, symptoms, diagnostic parameters, preventive measures, surgical aspects and what all aspects a medical practitioner must counsel patient are explained in detail in this review.

**Keywords:** Chronic obstructive airway disease; COVID-19; lung infections; Pulmonary function tests

### Introduction

As we know, the whole world is now suffering with the different types of respiratory diseases. In general, these respiratory diseases are caused due to the polluted environment, unhygienic food intake, unhealthy lifestyle etc. These days, with this COVID pandemic, we are unable to take the breath peacefully from the mother nature.<sup>1,2</sup> This is how worse our current situation going on. By wearing up the masks for long time is also leading to several serious health issues. The drastic elevation of the pollution in the environment is one of the saddest parts, as we cannot get the enough pure oxygen from the plants and trees around us, with the increased vehicles and industries. Even the food we are having is also polluted and is been adulterated for making money with less crop. With the increase in technology, even the work pressure is leading to cause several diseases and failing to manage timings is the major drawback by the people who belong to this generation, where they eat at some odd timings. These all factors lead to several health issues unknowingly and most importantly, with the polluted air, there comes an attack on the respiratory system and damage of the respiratory organs.<sup>3,5</sup>

Chronic Obstructive Airway Disease (COAD) is also known as Chronic Obstructive Pulmonary Disease (COPD). It is a type of disease that is caused in the lungs. This group of lung disease generally worsens the breathing such as shortness of breath, uneasiness while taking breath etc. As we know, the lungs are the pair of air-filled organs that are located either side of the chest cavity.<sup>6,7</sup> The

air we inhale through trachea will reach the lungs through its tubular branches i.e., bronchi and bronchioles and from there the air passes till the alveoli where the oxygen in the air that inhaled will be absorbed in the blood vessels that are present in the alveoli.<sup>8-10</sup> These normally have some type of the sacs that are present within, which fills the air in the sac like a balloon. In case of the patients with the COAD, the air will be blocked as the air cannot be taken into the sacs. Generally, this air sac activity is very rapid and so the exchange of oxygen and carbon-dioxide happens so fast. Once the patient is suffering with the COAD, there will be difference in breathing and in some cases there are chances of sudden constriction of valves which block the airways and may lead to dysfunction of the lungs.

Chronic Obstructive Airway Disease (COAD) is one of the lung diseases that worsen the air way by blocking the inhaled air. Here, in general, when air is inhaled, the air sacs in the lungs i.e., alveoli will expand like a balloon with its elasticity and it compresses once air is exhaled. When one is suffering with COAD, the air passage would be less due to less elasticity of the air sacs, due to destruction of the air sacs, the thickened or inflamed part of the air sacs, due to the mucus clog or blockage. This can be of two types; Emphysema and chronic-bronchitis. Emphysema is one of the types of COAD which is seen in the people who breathe the irritants and also those who smoke. This emphysema literally destroys the alveoli and slowly weakens the air sac of the alveoli and reduces the surface area of the lungs and thereby the air cannot pass into the blood stream and also the elasticity will be lost. With the conditions seen in emphysema, COAD is coined. This condition is irreversible and therefore it can be treated which can be treated with slow progression in the cure. Chronic bronchitis is another form of COAD which is a serious condition, it can be either acute or chronic, that causes inflammation in the inner lining of the bronchial tubes, which block the airway and lead to uneasiness while breathing.<sup>11</sup> This condition usually have persistent cough, thick reddish to brownish mucus etc. Also, shortness of breath, pain in the chest is seen. It lasts for about months to years. On basis of the individual's immune system, people may suffer with emphysema or chronic bronchitis. Some may suffer with both the conditions.<sup>12,13</sup>

### Symptoms of COAD

There are several conditions where the severity of the two types of the COAD start with. There are the cases where the individuals can have the two COAD types and also few typical situations where, no differentiation can be observed. In the below Table 1, the symptoms of emphysema vs. chronic bronchitis are mentioned. Few of the generalized symptoms are as follows;<sup>14-16</sup>

*Department of Pulmonary Medicine, BAYLOR College of Medicine, Texas, USA*

**Corresponding author:** Blessy Bronson  
*e-mail:* [blessybronson@bcm.edu](mailto:blessybronson@bcm.edu)

- Difficulty in breathing
- Shortness of breath
- Heart problems
- Lung cancer
- Pulmonary embolus

**Table 1:** Symptoms seen in emphysema or chronic bronchitis.

| Symptoms                          | Emphysema | Chronic-Bronchitis |
|-----------------------------------|-----------|--------------------|
| Fever                             | -         | ✓                  |
| Cough                             | -         | ✓                  |
| Shortness of breath               | ✓         | ✓                  |
| Excess mucus production           | -         | ✓                  |
| Fatigue                           | ✓         | ✓                  |
| Persistent symptoms               | -         | ✓                  |
| Difficulty while performing tasks | ✓         | -                  |

### Diagnostic parameters

There are many tests to be performed to diagnose the COAD and to start the right treatment. Once the physical examination, medical tests and the symptoms are assessed, the treatment must be started to prevent the damage of the lungs. The tests to diagnose the COAD are;<sup>17,18</sup>

**Imaging tests:** A chest X-ray as well as the CT-scan are the choice of tests that are firstly suggested by any medical practitioner in order to detect the possible causative infection for the symptoms that are been shown. X-ray is preferable in terms when the patient is with acute or mild symptoms and when the patient condition is too critical and to know the exact internal situation as well as the level of infection, Chest CT-Scan is suggested.

**Alpha-1 antitrypsin (AAT) test:** AAT protein generally protects the elasticity of the lung and people with AAT protein deficiency will be more likely to trigger with emphysema, even if they doesn't have the smoking history.

**Pulmonary function tests:** Here a spirometer is used to measure how strong the airflow is there and how good the lungs are functioning. Also, it gives a significance that, how well the lungs are able the lungs and how extent the air is flowing into and outside of the lungs. This test helps the doctor to estimate the patient's level of lung condition.

**Arterial blood gas test:** This is a blood test that provides the accurate reading of the levels of oxygen, carbon-dioxide also pH in the blood. The readings give an idea how competently the lungs are functioning and how extent the blood is holding the oxygen in it.

### Preventive Measures for COAD

With the life style and age, lungs do lose their capacity and even we can observe decrease in size after reaching mid- 25's. There are some exercises to reduce and even to maintain the lung capacity such that to keep lungs healthy and supply required and enough oxygen to keep lungs healthy.<sup>19,20</sup>

### Breathing exercises

There are certain breathing exercises that help to engage the diaphragm to lift the oxygen easily. Certain breathing exercises that are effective are; diaphragmatic breathing, pursed-lips breathing etc.

**Diaphragmatic breathing:** This type of breathing is also known as belly breathing. This breathing technique is generally used and so helpful for the patients those who are suffering with the COAD as the diaphragm is not that supportive in the patients those who are suffering with the COAD.

**Pursed-lips breathing:** This type of breathing is generally used for calm down the breath speed. It keeps the airways open for long time and makes easier for to exchange the oxygen and carbon-dioxide.

### Lifestyle changes

In order to lungs healthy, there must be the changes to be made in the lifestyle, such as;

- Avoiding smoking may help in reducing the effects of the shortness of breath and also by avoiding such environmental changes where irritants as well as the places where pollution is more.
- Intake of high antioxidant rich foods
- Performing breathing exercises

### Medical Care for COAD

There are several medicines being used for treating the COAD, also available over the counter. Medications such as the bronchodilators, antibiotics etc., can be used.<sup>21-25</sup>

### Vaccination

For the flu and pneumonia (pneumococcal pneumonia) there are vaccines available and by this it can boost the immune system and maybe less chances for causing COAD. By getting jabbed, it doesn't mean that it prevents the cause of COAD, but it reduces the chances of the occurrences or it will minimize from the chronic to the acute.

### Bronchodilators

These help in relaxing the muscles around the airways, removes the blockage and allows the airways to expand freely and makes breathing easier. Mostly these are available in the form of inhalers.

### Antibiotics

These generally are helpful for fighting against the bacterial or viral infections. There are several antibiotics, but the dose and medicine, composition changes from one patient to another as the body type, sensitivity and most importantly the condition of the disease or infection, the

medication varied. Not every individual can take the same medicine, so there must be a doctor consultation as the infection of lungs is something that is life threatening.

## Oxygen therapy

As we know, COAD attacks the functioning of the lungs and destructs the oxygen flow into the blood stream. Therefore, the oxygen therapy helps to forcibly allow the oxygen to reach the blood stream and makes breathing easier.

## Pulmonary rehabilitation

This is applicable for the people with chronic breathing issues which help in improving breathing. This firstly includes the quitting of smoking etc.

## Patient counselling

Than the seriousness of the disease, the psychological aspect of the patient plays the crucial role. So, it is completely a medical practitioner's responsibility to make understand a patient's health condition and make him/her aware of the disease. Also, a doctor must suggest the patient with all nutritional values which helps to keep the lungs healthy.

## Discussion

### Surgery aspects for COAD

Usually, the patients whose symptoms or the infection do not get rid of the infection even after using the course of medication, such type are suggested or urged for the surgery. In comparison of the two types of the COAD, emphysema has two forms of the surgeries. One is by removing the damaged lung tissue and the other is removal of the large air spaces of the air sacs which will result in free breathing.

## Conclusion

The Chronic Obstructive Airway Disease (COAD) is one of the dangerous diseases that is been caused due to the several factors such as the lifestyle patterns also the unhealthy habits. There are certain preventive measures as well as the diagnostic characteristics that are to be followed to be away from this chronic disease. Even there are the vaccines available to boost up the immune system and prevent the disease severity. The emergence of the awareness programmes is necessary for the public as there must be an idea in every individual to know about the airway diseases. Medicaments are to be used under doctor's concern but these days, with the increase in number of the pharmacies, the people are been used to use the medicine but they won't last long. Therefore, people should also understand that unless and until they get diagnosed and use medicine that is prescribed by doctor, one cannot expect betterment in the infection. The different causatives, the symptoms that are observed in both types of COAD are mentioned. Also, the diagnostic parameters, medical care to be taken, preventive measures were well covered in this review. As this is mostly seen in people with the smoking habit and other orally taken things, quitting them may re-

sult with the better and good effects.

## References

1. Sherrill DL, Lebowitz MD, Knudson RJ, et al. Smoking and symptom effects on the curves of lung functional growth and decline. *Am Rev Respir Dis* 1991; 144: 17–22.
2. Martin TR, Raghu G, Maunder RJ, Springmeyer SC. The effects of chronic bronchitis and chronic airflow obstruction on lung cell populations recovered by bronchoalveolar lavage. *Am Rev Respir Dis* 1985; 132: 254–260.
3. Lacoste JY, Bousquet J, Chanez P, et al. Eosinophilic and neutrophilic inflammation in asthma, chronic bronchitis and chronic obstructive pulmonary disease. *J Allergy Clin Immunol* 1993; 92: 537–548.
4. Wenzel S, Irani M, Sanders MA, et al. Immunoassay of tryptase from human mast cells. *J Immunol Meth* 1986; 86: 139–142.
5. Pesci A, Rossi GA, Bertorelli G, et al. Mast cells in the airway lumen and bronchial mucosa of patients with chronic bronchitis. *Am J Respir Crit Care Med* 1994; 149: 1311–1316.
6. Baraldo S, Turato G, Saetta M. Pathophysiology of the small airways in chronic obstructive pulmonary disease. *Respiration* 2012; 84: 89–97.
7. James C Hogg, Fanny Chu, Soraya Utokaparch, et al. The nature of small-airway obstruction in chronic obstructive pulmonary disease. *N Engl J Med* 2004; 350: 2645–2653.
8. Knowles MR, Boucher RC. Mucus clearance as a primary innate defense mechanism for mammalian airways. *J Clin Invest* 2002; 109:571-577.
9. James AL, Hogg JC, Dunn LA, et al. The use of the internal perimeter to compare airway size and to calculate smooth muscle shortening. *Am Rev Respir Dis* 1988; 138: 136-139.
10. Retamales I, Elliott WM, Meshi B, et al. Amplification of inflammation in emphysema and its association with latent adenoviral infection. *Am J Respir Crit Care Med* 2001;164:469-473.
11. Mannino DM. COPD: Epidemiology, prevalence, morbidity and mortality, and disease heterogeneity. *Chest*. 2002; 121(5): 121–126.
12. Krepnek GH, Skrepnek SV. Epidemiology, clinical and economic burden, and natural history of chronic obstructive pulmonary disease and asthma. *Am J Manag Care*. 2004; 10 (5): 129–138.
13. Pauwels RA, Buist AS, Ma P, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: National Heart, Lung, and Blood Institute and World Health Organization Global Initiative for Chronic Obstructive Lung Disease (GOLD): executive summary. *Respir Care*. 2001; 46: 798–825 .

14. Lacy P, Lee JL, Vethanayagam D. Sputum analysis in diagnosis and management of obstructive airway diseases. *Ther Clin Risk Manag* 2005; 1: 169–179.
15. Calverley PM, Anderson JA, Celli B, et al. Salmeterol and fluticasone propionate and survival in chronic obstructive pulmonary disease. *N Engl J Med* 2007; 356: 775–789.
16. Isaak M, Ulu A, Osunde A, et al. Benralizumab improves symptoms of patients with severe, eosinophilic asthma with a diagnosis of nasal polyposis *Curr Allergy Asthma Rep* 2021; 25(4): 21-24.
17. Flegal KM, Kruszon-Moran D, Carroll MD, et al. Trends in obesity among adults in the United States, 2005–2014. *JAMA* 2010; 303:2284–2291.
18. Jindal SK, Aggarwal AN, Chaudhry K, et al. Respiratory Epidemiology in India. *Indian J Chest Dis Allied Sci* 2006; 48(1):23-9.
19. World Health Organization .The GOLD global strategy for the management and prevention of COPD. 2005.
20. Celli BR, Halbert RJ, Isonaka S. Population impact of different definitions of airway obstruction. *Eur Respir J* 2003; 22:268-273.
21. Riley DJ, Thakker-Varia S, Poiani GJ, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease, NHLBI/WHO Global Initiative for Chronic Obstructive Lung Disease (GOLD) Workshop Summary 1997; 1589–1597.