

**CONSERVATIVE AND MEDICINAL APPROACHES, BRONCHODILATORS,
INHALED CORTICOSTEROIDS, AND OXYGEN THERAPY IN THE
TREATMENT OF COPD**

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Abstract: Chronic obstructive pulmonary disease (COPD) is a progressive disease characterized by airflow limitation and chronic airway inflammation. The treatment of COPD is based on conservative and medicinal approaches aimed at reducing symptoms, improving patients' quality of life, and slowing disease progression. This article discusses key methods of treating COPD, including bronchodilators, inhaled corticosteroids, and oxygen therapy.

Keywords: COPD, bronchodilators, inhaled corticosteroids, oxygen therapy, treatment.

Chronic obstructive pulmonary disease (COPD) is one of the leading chronic respiratory diseases, significantly reducing quality of life and increasing mortality worldwide. The main approaches to COPD treatment are focused on symptom control, preventing exacerbations, and improving lung function. Conservative treatment includes smoking cessation, physical activity, and rehabilitation, while medicinal treatment involves the use of bronchodilators, inhaled corticosteroids, and oxygen therapy.

Conservative Approaches to COPD Treatment

Smoking Cessation

Smoking cessation is the most critical strategy in COPD treatment, as smoking is the primary risk factor for the development and progression of the disease. Continuing to smoke exacerbates airway inflammation, accelerates the decline in lung function, and increases the risk of exacerbations. Quitting smoking can significantly slow the progression of COPD and reduce mortality. Various methods, such as nicotine replacement therapy, counseling, psychosocial support, and pharmacotherapy (varenicline, bupropion), are used to help patients quit smoking.

Physical Rehabilitation

Physical activity and rehabilitation play an essential role in maintaining physical performance in patients with COPD. Pulmonary rehabilitation programs include physical exercises, breathing exercises, and patient education. These programs help improve exercise tolerance, reduce dyspnea, and enhance quality of life. Additionally, they improve the psychological well-being of patients, reducing anxiety and depression levels.

Medicinal Approaches to COPD Treatment

Bronchodilators

Bronchodilators are the primary group of medications used in COPD treatment, designed to expand the airways and improve airflow. They are divided into two categories: short-acting and long-acting bronchodilators.

- **Short-acting bronchodilators** (e.g., salbutamol and ipratropium) are used for rapid symptom relief during exacerbations or to relieve dyspnea.
- **Long-acting bronchodilators** (e.g., tiotropium, formoterol, salmeterol) are used regularly to improve lung ventilation and reduce exacerbation frequency.

Long-term use of bronchodilators improves lung function, reduces dyspnea, and enhances patients' quality of life. They also play a crucial role in reducing hospitalizations and slowing disease progression.

Inhaled Corticosteroids (ICS)

Inhaled corticosteroids (ICS) are used in patients with moderate to severe COPD, especially if there are frequent exacerbations. ICS (e.g., budesonide, fluticasone) have anti-inflammatory effects, reducing the levels of inflammatory cytokines and alleviating airway edema. They help reduce the frequency of exacerbations and improve patients' overall condition.

However, there is a certain risk of side effects associated with long-term ICS use, such as oral candidiasis and an increased risk of pneumonia. Therefore, ICS are usually prescribed in combination with long-acting bronchodilators (e.g., salmeterol and fluticasone combination).

Oxygen Therapy

Oxygen therapy is a vital component in treating COPD patients with chronic hypoxemia (low blood oxygen levels). Long-term oxygen therapy, administered for at least 15 hours a day, can increase the life expectancy of patients with severe COPD and prevent complications such as pulmonary hypertension and heart failure.

Oxygen therapy also improves quality of life, reduces dyspnea, and increases patients' physical activity. However, prescribing oxygen therapy requires careful assessment of the patient's condition, as excessively high oxygen levels may lead to hypoventilation and carbon dioxide retention.

Combination Therapy

For patients with moderate to severe COPD, combination medicinal therapy, involving the simultaneous use of several drug classes, is often employed. The main combinations include:

- **Bronchodilators + inhaled corticosteroids (ICS):** The combination of long-acting β_2 -agonists with ICS enhances the bronchodilation effect and suppresses inflammation. This helps reduce the frequency of exacerbations, improve lung function, and reduce dyspnea. However, ICS should be prescribed with caution, as prolonged use of steroids can increase the risk of infections, including pneumonia.

- **Dual** **bronchodilation:**
The combination of two different types of bronchodilators—long-acting β_2 -agonists and long-acting anticholinergic agents—is considered the standard treatment for moderate to severe COPD. This combination provides more effective symptom control and improved lung function compared to using a single drug.
- **Triple** **therapy:**
For patients with frequent exacerbations and severe symptoms, triple therapy may be prescribed, which includes a long-acting β_2 -agonist, a long-acting anticholinergic agent, and an inhaled corticosteroid. Triple therapy has been shown to effectively reduce exacerbation frequency, improve quality of life, and enhance lung function in patients with severe COPD.

Mucolytic Therapy

For some COPD patients, mucolytic therapy is indicated to thin and improve mucus clearance. Medications such as N-acetylcysteine (NAC) and carbocysteine can help alleviate the symptoms of chronic cough with sputum. Mucolytics reduce mucus viscosity, facilitating easier expectoration and reducing the risk of infectious complications caused by stagnant mucus.

Antibiotics in COPD

COPD patients are at high risk for respiratory infections, which can lead to disease exacerbations. Antibiotics are prescribed during exacerbations caused by bacterial infections, and in cases where patients show signs of infection (e.g., increased mucus volume and changes in color, elevated body temperature). The most commonly used antibiotics include broad-spectrum agents such as amoxicillin/clavulanate, macrolides (azithromycin), or respiratory fluoroquinolones (levofloxacin).

Non-Steroidal Anti-Inflammatory Drugs

Research suggests that macrolides, such as azithromycin, have not only antibacterial but also anti-inflammatory properties. Long-term use of low-dose macrolides can reduce exacerbation frequency in COPD patients. However, caution is required due to potential side effects, such as antibiotic resistance and cardiovascular complications.

Innovative Approaches in COPD Treatment

Modern research is focused on discovering new methods for treating COPD, considering the complexity of the disease's pathogenesis. Such approaches include:

1. **Biologic** **Therapy:**
Biologic drugs targeting specific inflammatory cytokines, such as interleukin-5 (IL-5) and tumor necrosis factor-alpha (TNF- α), are being investigated for treating patients with severe COPD and marked eosinophilia. Monoclonal antibodies like mepolizumab, already used for asthma treatment, are actively studied for their use in COPD therapy.
2. **Phosphodiesterase-4 Inhibitors (PDE4 Inhibitors):**
Drugs in this group, such as roflumilast, block the enzyme phosphodiesterase-4, leading to a reduction in the inflammatory response in the lungs. Roflumilast is indicated for patients

with severe COPD and frequent exacerbations, particularly if they have concomitant chronic bronchitis.

Conclusion

COPD treatment includes a wide range of conservative and medicinal methods aimed at improving symptoms, slowing disease progression, and preventing exacerbations. Key approaches include bronchodilators, inhaled corticosteroids, and oxygen therapy, while combination therapy allows for maximum treatment efficacy. Research into new treatment methods, such as biologic drugs and PDE4 inhibitors, opens up new prospects for improving the quality of life for COPD patients.

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