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Effects of Roxithromycin Combined with Seretide on Pulmonary Function and Inflammatory Factors in Elderly Patients with Severe Stable COPD

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Abstract

Objective: To explore the effects of roxithromycin combined with seretide on pulmonary function and inflammatory factors in serum of elderly patients with severe stable chronic obstructive pulmonary disease (COPD). **Methods:** A total of 100 elderly patients with severe stable COPD were selected from February 2017 to February 2018, and were randomly divided into the control group and observation group, 50 cases in each group. The patients in control group were treated with seretide on the basis of conventional treatment, while those of the observation group were given roxithromycin combined with seretide on the basis of conventional treatment. The clinical efficacy, pulmonary function indicators and inflammatory factors were compared between the two groups before and after treatment. **Results:** After treatment, the 6-min walk distance in the control group was significantly higher than that before treatment ($p < 0.05$), the sputum volume and 6-min walk distance in the observation group were significantly higher than those before treatment ($p < 0.05$). In addition, the sputum volume and 6-min walk distance in the observation group were significantly higher than those in the control group ($p < 0.05$). After treatment, both FEV1/FVC and FEV1% Pred in the two groups were significantly higher than those before treatment ($p < 0.05$), and the above pulmonary function indicators in the observation group were significantly higher than those in the control group ($p < 0.05$). Besides, after treatment, the levels of CRP, IL-8 and TNF-α in the two groups were significantly lower than those before treatment ($p < 0.05$), and the above inflammatory factors in the observation group were significantly lower than those in the control group ($p < 0.05$). **Conclusion:** Roxithromycin combined with seretide in the treatment of elderly patients with severe stable COPD has significant clinical efficacy, can significantly improve the pulmonary function and inflammatory factor levels of patients.

1 Introduction

Chronic obstructive pulmonary disease (COPD) is a common disease characterized by persistent respiratory symptoms and airflow limitation, ranking the fourth leading cause of death worldwide, and the incidence of COPD in the population over 40 years old in China is approximately 8.2% [1]. COPD not only causes damage to the lung ventilatory function of patients, but also often induces respiratory failure, leading to systemic multiple organ failure and then death [2]. Although the pathogenesis of COPD has not been resolved, it was pointed out, for the first time in 2006, that COPD is a treatable and preventable disease [3]. At present, the treatment drugs of Western medicine for COPD mainly include anticholinergic drugs, β_2 receptor drugs, theophylline drugs and anti-inflammatory drugs, which can quickly control the disease, improve the symptoms of patients, and improve the quality of life of patients [4]. This study aimed to investigate the effect of roxithromycin combined with seretide on pulmonary function and serum inflammatory factors in elderly patients with severe COPD at stable stage.

2 Materials and methods

2.1 General data

A total of 100 elderly patients with severe stable COPD diagnosed and treated in our hospital from February 2017 to February 2018 were divided into the control group and observation group according to the random number table method, with 50 patients in each group. Inclusion criteria: the patients who met the diagnostic criteria and grading criteria of the *Guidelines for the diagnosis and treatment of chronic obstructive pulmonary disease* (2013 revision); those were 45 to 85 years of age, had not used other medications for 1 month before treatment, and were in a stable stage (no acute exacerbation of symptoms such as cough, cough yellow phlegm, fever, and abnormal white blood cell count, and the above symptoms remained stable for more than 4 weeks). Exclusion criteria: the patients who were intolerant to the drugs used in this study, and those with bronchitis, bronchial asthma, tuberculosis, lung cancer and other lung diseases, developed acute exacerbation of chronic obstructive pulmonary disease (AECOPD) during this study, and had a history of chronic alcoholism, mental illness and drug abuse. Control group included 29 males and 21 females, with a mean age of 65.57 ± 15.93 years and a mean disease duration of 12.13 ± 3.21 years, and observation group comprised of 27 males and 23 females, with a mean age of 67.24 ± 13.39 years and a mean disease duration of 11.62 ± 2.85 years. There was no significant difference between the two groups in the general data such as gender, age and disease duration, which were comparable ($p > 0.05$).

2.2 Treatment

All patients received the following conventional treatments: daily oxygen inhalation treatment, relieving cough and eliminating phlegm treatment, resolving phlegm and relieving asthma treatment, anti-infection prevention treatment, nutrition support, muscle training and strengthening patient immunity. The control group received seretide (1 puff/time, 2 times/d) on the basis of conventional treatment, and the observation group received roxithromycin (0.15 μg/d, 1 puff/d) orally on the basis of the former, and all patients were maintained on this treatment for 3 months.

2.3 Evaluation indicators

Clinical efficacy, pulmonary function, and inflammatory factors were compared between the two groups before treatment and after 3 months of treatment. (1) Clinical efficacy, the sputum volume was classified into four levels: no sputum (0 points), sputum volume ≤ 50 mL/day (1 point), 51 ≤ sputum volume ≤ 100 mL/d (2 points), and sputum volume over 100 mL/d (3 points). 6-min walk distance: patients were told to performed three 6-min walk tests

in the ward corridor that marked with the distance in advance, and a 6-min walk maximum distance was obtained. (2) Pulmonary function indicators, forced expiratory volume in 1 s (FEV1), the ratio of FEV1 to forced vital capacity (FVC) (FEV1/FVC), and the percentage of FEV1 in the predicted value (FEV1% Pred) were examined. (3) Serum inflammatory factors, including C-reactive protein (CRP), interleukin-8 (IL-8), tumor necrosis factor-α (TNF-α) were measured by collecting blood samples from patients, among which CRP was detected by immunoturbidimetry, IL-8 and TNF-α were detected by enzyme-linked immunosorbent assay (ELISA).

2.4 Statistical analysis

Statistical analysis was performed using SPSS 20.0, and the count data were compared using X^2 test, the measurement data were expressed as the mean ± standard deviation and compared by t test, with $p < 0.05$ as the difference being statistically significant.

3 Results

3.1 Clinical efficacy

Before treatment, there was no significant difference between the two groups in sputum volume grading and 6-min walk distance ($p > 0.05$). After 3 months of treatment, the 6-min walk distance of control patients was significantly higher than that before treatment ($p < 0.05$), while the sputum volume grade in the observation group was lower but 6-min walk distance were significantly higher than those before treatment ($p < 0.05$), and were significantly better than those in the control group, as exhibited in Table 1.

Table 1 Comparison of clinical efficacy between the two groups.

Group	Cases	Sputum volume grade		6-min walk distance (m)	
		Before treatment	After 3 months of treatment	Before treatment	After 3 months of treatment
Observation group	50	1.95 ± 0.49	1.44 ± 0.17 *	88.29 ± 16.33	110.35 ± 22.19 *
Control group	50	2.01 ± 0.38	1.91 ± 0.26	85.35 ± 15.37	97.24 ± 19.28 *
t		0.684	10.698	-0.927	-3.154
p		0.495	0.000	0.356	0.002

Note: compared with before treatment, * $p < 0.05$.

3.2 Pulmonary function

Before treatment, the FEV1/FVC and FEV1% Pred in the two groups were not significantly different ($p > 0.05$); however, after 3 months of treatment, the FEV1/FVC and FEV1% Pred in the two groups were significantly higher than those before treatment ($p < 0.05$), and the above pulmonary function indicators in the observation group were significantly higher than those in the control group ($p < 0.05$, Table 2).

3.3 Inflammatory factors

Before treatment, there was no significant difference in the levels of CRP, IL-8 and TNF-α between the two groups ($p > 0.05$), whereas the levels of CRP, IL-8 and TNF-α in the two groups were significantly lower than those before treatment after 3 months of treatment ($p < 0.05$), and the levels of the above inflammatory factors in the observation group were significantly lower than those in the control group ($p < 0.05$), as shown in Table 3.

Table 2 Comparison of pulmonary function indicators between the two groups.

Group	Cases	FEV1/FVC		FEV1%Pred	
		Before treatment	After 3 months of treatment	Before treatment	After 3 months of treatment
Observation group	50	55.39 ± 11.21	85.61 ± 16.19 *	60.18 ± 12.26	82.35 ± 15.19 *
Control group	50	57.23 ± 12.38	72.16 ± 14.42 *	62.33 ± 13.17	70.67 ± 16.41 *
t		-0.779	4.387	-0.845	3.693
p		0.438	0.000	0.400	0.000

Note: compared with before treatment, * $p < 0.05$.

Table 3 Comparison of inflammatory factors between the two groups.

Group	Cases	CRP (ng/L)		IL-8 (ng/L)		TNF-α (ng/L)	
		Before treatment	After 3 months of treatment	Before treatment	After 3 months of treatment	Before treatment	After 3 months of treatment
Observation group	50	72.26 ± 15.33	35.55 ± 7.23 *	76.58 ± 15.97	37.36 ± 8.18 *	80.16 ± 16.25	33.15 ± 6.72 *
Control group	50	74.35 ± 13.61	50.26 ± 10.03 *	74.23 ± 12.64	53.38 ± 11.65 *	78.51 ± 14.67	49.24 ± 9.21 *
t		-0.721	8.413	0.820	-7.958	0.533	-9.979
p		0.473	0.000	0.414	0.000	0.595	0.000

Note: compared with before treatment, * $p < 0.05$.

4 Discussion

As a common respiratory disease in the elderly, COPD imposes a heavy burden on the patient's family and society because of its high morbidity and mortality, and is a serious public health problem in China [5]. Recent findings have shown that COPD is associated with human inflammatory mediators, imbalance of protease and anti-protease, oxidative stress, and tobacco smoke. Currently, the drug therapy of Western medicine mainly relies on relaxing the trachea and reducing the inflammatory response, and commonly used drugs include bronchodilators that relieve symptoms in patients, long-acting and short-acting β_2 receptor drugs, anticholinergic drugs that block M choline receptors, theophylline drugs that relieve airway smooth muscle spasms, anti-inflammatory phosphodiesterase-4, and so on [6,7]. In this study, the combination of roxithromycin and seretide in treating elderly patients with COPD had a significant clinical effect, which is able to improve patients ' pulmonary function and the levels of inflammatory factors.

Relevant studies have shown that seretide belongs to the class of bronchodilator drugs, which is a composite preparation composed of the long-acting β_2 receptor drug salmeterol and the glucocorticoid fluticasone propionate [8]. Among them, salmeterol can accelerate glucocorticoid receptor displacement, elevate the corresponding gene transcription rate, inhibit T lymphocyte proliferation and migration, reduce eosinophil adhesion molecule expression, stimulate inflammatory cell apoptosis, thus inhibiting persistent bronchiectasis, and the activation and generation of multiple inflammatory cells and inflammatory factors [9]. Fluticasone propionate mainly acts on multiple links in inflammation, the modification of inflammatory gene expression, the reduction on the production and exudation of inflammatory cells, and the prevention against the release of inflammatory mediators. As a macrolide antibiotic, roxithromycin not only exerts good antibacterial effects, but also inhibits inflammatory mediator release. Meanwhile, roxithromycin regulates body immune function, balances oxidation and antioxidant system, and a large number of studies

have demonstrated the application of macrolide s in the treatment of COPD [10].

Our results showed that after treatment, sputum volume grade and 6-min walk distance of patients in the observation group were significantly better than those in the control group ($p < 0.05$). Also, FEV1/FVC and FEV1% Pred of patients in both groups were significantly higher than those before treatment ($p < 0.05$), and the above-mentioned pulmonary function indicators in the observation group were significantly higher than those in the control group ($p < 0.05$). The above results proved that on the basis of conventional treatment and seretide treatment, the combination with macrolide drug roxithromycin could significantly reduce the sputum volume, improve activity ability and pulmonary function of patients. Roxithromycin can obstruct the water channel of respiratory tract to decrease the secretion of clogged respiratory mucus, protect epithelial tissues, improve the stability of cell membrane, reduce the blockage of respiratory airways, and then improve the clinical symptoms and pulmonary function of patients.

In addition, the results also showed that after treatment, the levels of CRP, IL-8 and TNF-α in the serum of both patients were significantly lower than those before treatment ($p < 0.05$), and those of the above-mentioned inflammatory factors in the observation group were significantly lower than those in the control group ($p < 0.05$), which proved that roxithromycin combined with seretide in the treatment of COPD can significantly alleviate the systemic inflammation in the blood circulation. Roxithromycin has independent anti-inflammatory and immunomodulatory effects and is able to inhibit the proliferation and aggregation of neutrophils and eosinophils in the inflammatory site, reduce the production of various inflammatory factors in serum, and ultimately improve the levels of inflammatory factors in serum.

In conclusion, roxithromycin combined with seretide has significant clinical efficacy in the treatment of elderly patients with severe stable COPD, which can significantly improve the pulmonary function and the levels of inflammatory factors, and then improve the life quality of patients.

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Not applicable.

Conflicts of Interest

The authors declare no conflicts of interest.

Author Contributions

Conceptualization, X.L.; Data curation, J.Z.; Formal analysis, X.L.; Methodology, J.Z.; Writing-original draft, X.L.; Writing-review and editing, J.Z.; All authors have read and agreed to the published version of the manuscript.

Ethics Approval and Consent to Participate

The study was approved by the Medical Ethics Committee, and the patients were informed and consented.

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Availability of Data and Materials

The data presented in this study are available on request from the corresponding author.

Supplementary Materials

Not applicable.

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