Effect of Doxorubicin Combined with Ipratropium Bromide on Pulmonary Function Indexes in the Treatment of Chronic Obstructive Pulmonary Disease

Rong Fan, Wei Xiao, Weihua Hu, Zhu Wu*
Jingzhou First People's Hospital, Jingzhou 434000, China.

Abstract: Objective: To observe the effect of different methods in the treatment of chronic obstructive pulmonary (COPD) disease. Methods: 86 COPD patients attending the clinic from 2020.7 to 2022.11 were divided into groups I and II according to the envelope method, 43 cases each were treated with theophylline extended-release tablets and group II was treated with ipratropium bromide, the lung function indexes of each group were tested and the total effective rate was calculated and compared between groups. Results: At the end of the treatment course, FEV1, FVC and FEV1/FVC levels in group II were higher than those in group I, and the difference reached a significant level ($P < 0.05$). The total effective rate in group I was 74.42%, which was lower than that in group II, which was 95.35%, forming a significant difference ($P < 0.05$). Conclusion: Treatment with doxorubicin combined with ipratropium bromide for those with COPD is effective and worthy of popular application.

Keywords:Chronic Obstructive Pulmonary Disease; Doxorubicin; Ipratropium Bromide; Pulmonary Function; Total Effective Rate

Introduction

Pulmonary function is one of the common clinical indicators to assess the level of lung function of the body, so early restoration of lung function in COPD patients can more effectively curb the progression of the disease, reduce symptoms and achieve early recovery. Doxorubicin is a commonly used bronchodilator with antispasmodic and antiasthmatic effects, which helps to reduce the symptoms of dyspnoea. ipratropium bromide does not produce large irritation after nebulised inhalation, and is effective in relieving wheezing and breathlessness[1]. Doxorubicin and ipratropium bromide have been reported more frequently in the monotherapy of COPD, and the combined use of the drugs has been reported more rarely. In this paper, 86 patients' data were included to compare single and combined drug treatment for COPD, and the following report contents were significantly made.

1. Data and methods

1.1 General information

This subject was conducted with the approval of the ethics committee and the consent of the patients. The data of 86 COPD patients were sampled, and the time of consultation was from 2020.7 to 2022.11. The above enrolled patients were divided into two groups of 43 cases each, and the situation of each group was as follows.

Group I: 25 males and 18 females, aged 36 to 76 (55.94±3.62) years, duration of disease 2 to 12 (6.12±2.35) years.

Group II: 22 males and 21 females, aged 35-74 (56.32±3.70) years, with a disease duration of 3-13 (6.32±2.40) years, respectively.

The above demographic data of patients in groups I and II were similar, i.e. no significant difference was formed (P > 0.05).

1.2 Methods

In Group I, 200 p.p.m. of doxorubicin (basic amount) + 25% glucose injection was administered intravenously twice a day, the interval between the two injections was controlled to be 12h, and the duration of each injection was controlled to be about 25min. The dose of the drug was adjusted according to the patients' condition, and the patients were instructed not to consume caffeine-based food during the drug administration period.

In group II, the treatment regimen of doxorubicin was the same as that of group I, combined with nebulized inhalation of ipratropium bromide 2.5ml, 5~10min/time, 2 times d.

All groups were treated with the drug continuously for 14d.

1.3 Observation indexes

The levels of the 1sts force expiratory volume (FEV1) and force spirometry (FVC) were measured before and after treatment in each group, and FEV1/FVC values were calculated. Determination of efficacy: after treatment, the white blood cell (WBC) count returned to the normal range, the disease symptoms disappeared and no recurrence was recorded as significant effect; if the WBC count decreased to above the upper limit of normal, the symptoms decreased and no recurrence was recorded as improvement; if the disease did not improve before and after treatment, or there was different degrees of aggravation or recurrence, the disease was recorded as ineffective. Total effective rate = significant rate + improvement rate.

1.4 Statistical processing

SPSS32.0 software was used to process the data, and the values of lung function index tests were expressed as, and the rate (%) indicated the total effective rate, which was calculated by X^2. An empirical calculation of P < 0.05 indicated that the difference reached the level of significance.

2. Results

2.1 Pulmonary function

After drug treatment, lung function was recovered in all groups of patients, and patients in group II recovered better than group I, i.e. FEV1, FVC and FEV1/FVC values were all above group I, which was statistically significant (P < 0.05).

Table 1 Comparison of the results of pulmonary function indicators between the two groups of patients $(\bar{x} \pm s)$

Group（n）	Time	FEV1（L）	FVC（L）	FEV1/FVC（%）
II（43）	Before treatment	2.02±0.38	1.75±0.48	54.62±2.39
	After treatment	2.98±0.34	2.99±0.56	68.07±3.56
I（43）	Before treatment	2.04±0.41	1.68±0.41	53.97±2.43
	After treatment	2.28±0.36	2.13±0.37	58.01±3.09

2.2 Clinical efficacy

The total effective rate in Group II vs Group I was 95.35% vs 74.42%, which shows that the overall treatment effect of patients in the observation group was better (P < 0.05), Table 1.

Table 2 Comparison of patient outcomes between groups

Group（n）	Visible effect	Good turnaround	Invalid	Total validity（%）
II（43）	34	7	2	41（95.35）
I（43）	22	10	11	32（74.42）

3. Discussion

COPD is a highly prevalent respiratory disease with a complex etiology, and belongs to the category of airway inflammatory response diseases. In the context of increasingly serious air pollution and an ageing society, the prevalence of COPD in the elderly is increasing, endangering their health and increasing the burden of healthcare on the country [2].

Doxorubicin is commonly used in the treatment of COPD, and its effects are mainly focused on bronchodilatation, which in turn inhibits the phosphodiesterase activity in the airway smooth muscle cells of the patients, resulting in relaxation of airway smooth muscle and decompression. In this study, after 14 d of drug treatment, the FEV1, FVC and FEV1/FVC test values in group I were (2.28±0.36)L, (2.13±0.37)L and (58.01±3.09)% respectively, which were lower than those in group II (2.98±0.34)L, (2.99±0.56)L and (68.07±3.56)%. The difference was significant, suggesting a better improvement in lung function in Group II patients after treatment. The mechanism of action is anticholinergic. It relaxes the bronchi, reduces wheezing and other symptoms, inhibits remodelling and promotes the rapid expulsion of sputum into the body. Nebulised inhalation is not only a safe process, but also transforms the substance into an aerosol that can be inhaled directly into the lower airways and lungs, acting directly on the lesion and reducing the irritation caused to other parts of the body to more significantly reduce the disease and control it. The combination of medication can have a superimposed effect and strengthen the effect of medication, which has many advantages such as rapid effect and longer lasting effect. In this study, the total effective rate of group II reached 95.35%, higher than that of group I at 74.42%, which is consistent with the results of some previous reports in China [3], further confirming the effectiveness of combination drug therapy.

In conclusion, clinicians faced with COPD, patients are recommended to receive doxorubicin in combination with ipratropium bromide, which can more significantly improve patients' lung function and enhance the efficacy compared with the past single-drug approach, and is worth popularizing. However, reviewing the course of this study, the author is aware of some shortcomings, such as the small number of patients enrolled and the lack of observation of drug side effects and long-term efficacy, which should be improved in subsequent studies to provide more reliable theoretical support for the combination of drugs.

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Author Bio

First author.

Fan Rong (1980.1.10-), F, Han, Place of origin: Hubei. Jingzhou, MA, Title: Attending, Unit: Jingzhou First People's Hospital, Department: Department of Respiratory and Critical Care, Major research interests: Chronic obstructive pulmonary disease, interstitial lung disease, pulmonary embolism, pulmonary hypertension, ECMO life support, etc.

Corresponding author.

Wu zhu (1982.5.14-), Male, Han Nationality, Place of Origin: Xiangtan, Hunan Province, Master's Degree, Title: Attending Physician, Unit: Jingzhou First People's Hospital, Department: Breast Surgery, Main Research Interests: Comprehensive treatment of breast cancer, diagnosis and treatment of non-lactating mastitis, postoperative reconstruction of breast tumors, etc.

Second author.

Xiao Wei (1969.9.8-), Male, Ethnicity: Han, Origin: Jingzhou, Hubei Province, Highest Education: Master, Title: Chief Physician, Unit: Jingzhou First People's Hospital, Department: Department of Respiratory and Critical Care, Main research interests: chronic obstructive pulmonary disease; bronchial asthma; lung cancer; pulmonary embolism; interstitial lung disease, etc.

Third author.

Hu Weihua (1977.10.12-) Female, Ethnicity: Han, Place of origin: Jingzhou, Hubei, Highest education: Master, Title: Chief Physician

Unit: Jingzhou First People's Hospital, Department: Department of Respiratory and Critical Care Main research interests: chronic obstructive pulmonary disease; bronchial asthma; lung cancer; interstitial lung diseases, etc.