

## CASE REPORT

# An Introduction of the Vaporized Therapy with Tea Herb Drink for Relieving Agitation due to Pulmonary Encephalopathy

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### ABSTRACT

What methods would you choose apart from increasing sedatives for agitation in an advanced patient with hypercapnic encephalopathy due to AECOPD? This is a 94-year-old female who suffered from COPD for over 30 years, occurred with an accelerated episode of cough, productive sputum and a dropping down to 86% in SatO<sub>2</sub> due to a cold weather. A diagnosis of pulmonary encephalopathy (PE) was made on the basis of the subsequent agitation and delirium, and the sedatives, such as quatiapine and haloperidol, had to be given for her mental excitation respectively, but she still pulled out indwelling needle herself and refused to any infusion therapy. As an alternative, a vaporized therapy integrated with tea herb drinking had to be applied to relieving her agitation, being designed as the vaporization of the inhaled oxygenation by means of high-flow oxygenation device (HFOD), with an ampoule of ambroxol mixed into the inhaler and simultaneous drinking of TCM tea herb for reducing sputum, helping dissolve the mucoid bolts inside her terminal bronchioles when being infected. We thought that a better efficacy would be achieved for hypercapnic encephalopathy due to AECOPD if we concentrate on a good ventilation of small airway through the vaporized therapy.

## 1. Introduction

This is a case of chronic obstructive pulmonary disease (COPD) occurred in a 94-year-old female who complained of recurrent cough and expectoration for over 30 years, with an accelerated episode over the past week. Recently, an aggravated episode of cough emerged with lots of purulent sputum due to a cold weather, and her SatO<sub>2</sub> dropped once a time down to 86%. A diagnosis of

lower respiratory tract infection (LRTI) and secondary pulmonary encephalopathy (PE) was reasonably made according to her nocturnal agitation; and sedatives were given for her mental excitation. She refused to any infusion therapy, and a vaporized therapy integrated with TCM tea herb was designed, as an alternative, to help her expectoration for a better ventilation. Two days after realizing it, an easier expectoration came with a slight percussion, and she fell asleep easily without injecting any

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sedatives; her total situation also improved steadily since then.

## 2. Case Report

### 2.1 General Material

This was a 94-year-old female with a complain of recurrent cough with productive sputum for over 30 years, being admitted to hospital again with an accelerated episode of COPD. She had a 10-year history of Alzheimer's disease, being under good control in agitation regardless of memory loss and delirium sometimes. During the hospitalization, another aggravated episode of cough with purulent sputum came to her due to a cold weather, manifesting as a fever (38.4°C), apathetic, along with a poor appetite for eating and malaise in her body. She looked a bit emaciated, with a barrel chest, retention of her jugular veins, and finer moist rales were heard, in auscultation, on the bases of her lungs, especially on the right. CBC showed: WBC  $8.2 \times 10^9/L$ , N 76%; C-reactive protein 17.7 mg/L. Blood gas analysis: pH 7.45,  $pO_2$  45 mmHg,  $pCO_2$  37 mmHg, Lac 1.86 mmol/L. Thus a clinical diagnosis of low respiratory tract infection (LRTI) was made according to the patchy focus demonstrated in her lower lobe on the right on iconography (Figure 1).

As a response to LRTI, an cephalosporin compound, consisting of cefoperazone and sulbactam, 2 grams of which were given intravenously, every 8 hours; but the nocturnal excitation emerged with delirium, and 25 mg of quatiepine was applied firstly to dealing with her agitation. Furthermore, 5 mg of haloperidol mixed with 0.3 mg of scopolamine had to be injected intramuscularly

to help fall asleep lasting for a week. The patient pulled out indwelling needle herself during the hospitalization and refused to any infusion therapy because of agitation. Increasing the dose of quatiepine to 500 mg a day gradually, her  $SatO_2$  was dropped, once a time, down to 86%. As an alternative, a vaporized therapy integrated with TCM tea herb was applied to her phlegm obstruction, twice a day, to help with an easy expectoration for her.

### 2.2 A Composition of the Vaporized Therapy Integrated with Tea Herb Drinking and its Efficacy

A vaporization of the inhaled oxygenation integrated with TCM tea herb for expectoration was elaborately designed for the purpose of reducing sputum. We used a set of HFOD (Spirry®, Figure 2) to vaporize the inhaled oxygenation (Temp: 32°C, Oxygen Flow: 35 L/min, Oxygen %: 40%); and an ampoule of ambroxol was added to the inhaler every time to dissolve the mucoid bolts. Simultaneously, having TCM tea herb, consisting of adenophora, gypsum, licorice etc., can help reduce sputum, given twice a day, seven days for one course.

Prior to the vaporized therapy, several doses of haloperidol and scopolamine were forced to be injected intramuscularly to suppress her agitation. Two days after realizing it, the patient fell asleep at night without the help of any sedative injections, accompanied by easier expectoration with a slight percussion (Figure 2). It was showed on her repetitive blood gas analysis: pH 7.45,  $pO_2$  88 mmHg,  $pCO_2$  33 mmHg, Lac 1.34 mmol/L, much better than before; and so did the CT-scan for her lungs (Figure 1).

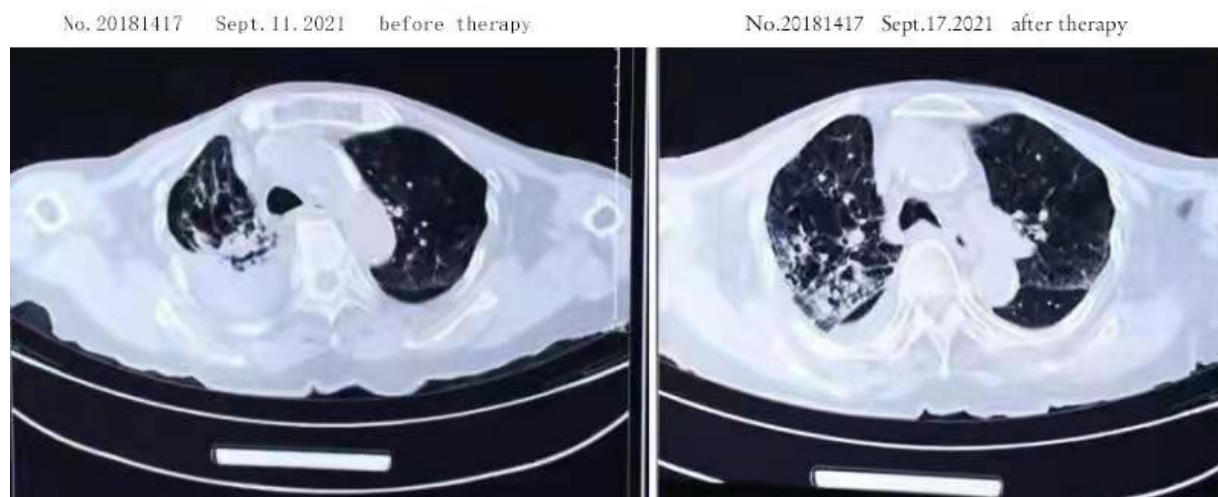


Figure 1. chest CT-scans before and after the vaporized therapy with TCM tea herb



**Figure 2.** high-flow oxygenation device and the subsequent expectoration

### 3. Discussion

#### 3.1 Reasons for a Combination of the Vaporized Oxygenation Helped with TCM Tea Herb

The mucoid bolts caused by AECOPD inside the terminal bronchioles would result in symptomatic pulmonary encephalopathy by blocking the tiny airway<sup>[1]</sup>, together with the concomitant endotoxemia from gram-negative bacilli (MDR) hidden inside muci, which should be tried to clear up from the airway<sup>[2]</sup>. The combined therapy for expectoration occurred to realize it, characteristic of the vaporization of the inhaled

oxygenation (mixed with 35% oxygen).

As a key step, it was designed elaborately to reduce the sputum with a higher viscosity, which reached to "throwing out" the mucoid sputum by means of High-Flow Oxygenation Device with a humidifier (Spirry®, HFOD). The inhaled gas had been vaporized with a temperature of 32°C and some moisture to dissolve the tiny sputum bolts inside.

During the process, an ampoule of ambroxol was mixed into the absorber. And the acidglycoprotein (AAG) in mucoid bolts, produced by Goblet Cell in the wall of bronchiole, can be restrained or broken up to lower the viscosity<sup>[3]</sup>.

The tea herb of TCM, consisting mainly of ephedra and almond, had been regarded for a long time as reducing sputum in ancient China. Nowadays, we added adenophora to the tea herb instead of ephedra and almond, aiming at Nourishing-Yin and reducing sputum based on the TCM theory<sup>[4]</sup>. And being accompanied by gypsum and licorice, the composition of tea herb here will help expectorate the mucoid sputum with the both lungs working well.

#### 3.2 Comparison with Classic Antibiotic Therapy

One type of powerful antibiotic therapy or combination of two types of antibiotics has always been chosen to treat the infection in lower respiratory tract (LRTI) for killing the pathogenic bacteria (MDR), but the side effects of them would emerge, as a consequence, about 3-5 days later in the aged, including the loss of appetite, antibiotic-associated diarrhea (AAD), and mental excitation provoked by carbapenams<sup>[5]</sup>. Recently, we focused on the tiny mucoid bolts inside the terminal bronchioles in patients with LRTI (AECOPD), which was key to pathogenesis of pulmonary encephalopathy. A rational integration of the vaporized oxygenation with the drinking of revised TCM tea herb was carefully designed to promote reducing sputum. Thus, the agitation due to being short of oxygen subsided in a shorter time.

The advantages of combined therapy were fully showed here: (1) Reducing sputum can throw away any kinds of germs no matter how they are gram-negative bacilli, fungi or germs resistant to antibiotics (MDR)<sup>[2]</sup>. (2) The vaporized therapy can decrease the exposure to powerful antibiotics by lowering the dose of antibiotics, which benefits from the proper use of antibiotics<sup>[6]</sup>, and helps control the total costs of medication with a better outcome.

This aged female suffered from AECOPD, associated with mental excitation from pulmonary encephalopathy. She refused to any infusion therapy in spite of advice. As

a compensation, the vaporized therapy with TCM tea herb had to be applied to relieving her symptoms. Two days after realizing it, the patient fell asleep without injecting any sedatives, and her total situation improved steadily since then. To verify its efficacy, the repetitive blood gas analysis and chest CT-scan were done, and the results showed a much better improvement than before.

#### **4. Conclusions**

We thought that a key to dealing with the agitation due to LRTI concerns about breaking down the tiny mucoid bolts in it, and a much better efficacy would be achieved if we concentrate on a good ventilation of small airway through the vaporized therapy.

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