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## **EXTERNAL RESPIRATORY FUNCTION IN A PATIENT AFTER REMOVAL OF THE MIDDLE AND LOWER LOBES OF THE RIGHT LUNG DUE TO CONGENITAL BRONCHIECTASIS**

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A clinical case of a female patient with obstructive bronchitis after right-sided bilobectomy due to congenital bronchiectasis which developed on the background of suspected genetic predisposition with clinical signs of respiratory failure, but without significant disorders by instrumental examination of the external respiration function.

**KEY WORDS:** external respiration function, right-sided bilobectomy of the lungs, congenital bronchiectasis

### **ФУНКЦІЯ ЗОВНІШНЬОГО ДИХАННЯ У ПАЦІЄНТКИ ПІСЛЯ ВИДАЛЕННЯ СЕРЕДНЬОЇ ТА НИЖНЬОЇ ДОЛЕЙ ПРАВОЇ ЛЕГЕНІ У ЗВ'ЯЗКУ ІЗ ВРОДЖЕНИМИ БРОНХОЕКТАЗАМИ**

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Клінічний випадок пацієнтки з обструктивним бронхітом після правобічної білобектомії зв'язку із вродженими бронхоектазами, що виникли на тлі підозрюваної генетичної схильності із клінічними ознаками дихальної недостатності, але без істотних порушень функції зовнішнього дихання при інструментальному обстеженні.

**КЛЮЧОВІ СЛОВА:** функція зовнішнього дихання, правобічна білобектомія легень, вроджені бронхоектази

### **ФУНКЦИЯ ВНЕШНЕГО ДЫХАНИЯ У ПАЦИЕНТКИ ПОСЛЕ УДАЛЕНИЯ СРЕДНЕЙ И НИЖНЕЙ ДОЛЕЙ ПРАВОГО ЛЕГКОГО ПО ПОВОДУ ВРОЖДЕННЫХ БРОНХОЭКТАЗОВ**

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Клинический случай пациентки с обструктивным бронхитом после правосторонней билобэктомии в связи с врожденными бронхоэктазами, который развился на фоне предполагаемой генетической предрасположенности с клиническими признаками дыхательной недостаточности, но без существенных нарушений при инструментальном исследовании функции внешнего дыхания.

**КЛЮЧЕВЫЕ СЛОВА:** функция внешнего дыхания, правосторонняя билобэктомия легких, врожденные бронхоэктазы

## **INTRODUCTION**

The function of external respiration refers to gas exchange between the air in the upper and lower respiratory tract. The task of breathing is to supply tissues with oxygen and remove carbon dioxide from the body [1].

To evaluate the function of external respiration, study of the volume and velocity characteristics, the following curves are used:

the flow-volume curve of the forced exhalation (for evaluating the ventilatory function of the bronchi), the indices of Tiffino and Gensler determined the presence of signs of obstruction [2], restrictive disorders are detected by measuring the total lung capacity and residual volume. The informativeness of the technique for determining bronchial resistance for the evaluation of bronchial obstructive syndrome is shown by scientists [3]. The proper values of

pulmonary volumes and indices of forced expiration and gradation of their changes are presented by R.F. Clement, E.A. Zilber [4].

One of the major causes of impaired function of external respiration is bronchoectatic lung disease that can lead to removal of part of the lungs, and occurs in 1.5 % of the population, most often in childhood. Bronchiectasis is defined as permanent dilatations of bronchi with destruction of the bronchial wall. Bronchiectasis was considered a morbid disease with a high mortality rate from respiratory failure and cor pulmonale [4]. The clinical picture varies greatly and may involve repeated respiratory infections alternating with asymptomatic periods or with chronic production of sputum. Bronchiectasis should be suspected especially when there has been no exposure to tobacco smoke [5].

Patients with bronchiectasis typically present with recurrent pulmonary infections, productive cough, bronchial suppuration and purulent bronchorrhea [1, 6]. Similar to our case, cough, purulent and fetid sputum and hemoptysis are the most common symptoms in other described cases [1, 6–8]. The goals of surgical therapy for bronchiectasis are to improve the quality of life and to resolve complications. There is also consensus that, because bronchiectasis is a progressive disease, affected regions should be resected in a way that preserves uninvolved lung parenchyma, and early pulmonary resection while the disease is still localized is preferred [2–3, 5, 7–12]. Ultimately, a minimum of two lobes or six pulmonary segments must be spared to ensure adequate pulmonary function [1, 9, 13–15]. For successful surgery, Kutly and colleagues recommend that the operation should be performed in «dry period», complete resection of suspected areas by intraoperative examination that could not be determined by radiological examination to decrease relapse rates, and surgical treatment in childhood because the residual lung could still grow to fill the space left in the chest after resection [7]. There is growing clinical evidence of accelerated or «catch-up» lung growth in youngsters whose lung disease is no longer active. Surgical therapy in case bronchiectasis also can lead change the function of external respiration.

This clinical case demonstrates the influence bilobectomy of the lungs in patient with congenital bronchiectasis on the function of

external respiration to determine the compensatory capabilities of the lungs after lobectomy.

## **CLINICAL CASE**

The patient C, a woman born in 1956, was admitted to the clinical base of internal medicine department in Railway Clinical Hospital № 1 of «HC» JSC «Ukrzaliznytsia» in December, 2016 with complaints of recurrent dry cough, shortness of breath, headache, dizziness, fatigue, weakness, decreased resistance to physical stress, high blood pressure periodically to 160/90 mm Hg.

## **HISTORY OF DISEASE**

Patient notes recurrence of obstructive bronchitis since birth. At the age of 14 bronchoscopy was performed and showed right-sided bronchiectasis, year later – right-sided bilobectomy was held in connection with congenital bronchiectasis. Consequently, with a diagnosis of chronic bronchitis she was observed by the pulmonologist, during exacerbations – inpatient treatment at the hospital.

The patient didn't follow prescribed treatment, used drugs irregularly.

In December 2016, suffered a sore throat, running nose, cough and fever till 38,5 for 3 days. Further the above symptoms have joined. She was admitted to day hospital of polyclinic 24 with diagnosis: chronic obstructive pulmonary disease (COPD). Chronic diffuse bronchitis in remission stage, condition after right-sided bilobectomy (1970) due to congenital bronchiectasis.

Patient received mucolytics (ambroxol), antiviral drugs (amizon).

## **ANAMNESIS VITAE**

Infections, injuries, tuberculosis, sexually transmitted diseases were denied.

Hereditary diseases were not identified.

Allergic history is not burdened.

Smoking denies.

Uses chemical agents for cleaning house.

Family history of known or suspected bronchiectasis is negative.

## **PHYSICAL EXAMINATION**

General condition is satisfactory, consciousness is clear, emotionally stable. Height – 168 cm, weight – 57 kg, BMI –

20.35 kg/m<sup>2</sup> (normal range for BMI – 18.5 to 24.9).

Skin is pale-pink, without any scars. Symmetrical mild shin pitting edema is present. Peripheral lymph nodes are not palpable, on palpation of the thyroid gland left lobe is palpated with elastic consistency, painless. Signs of eyelid retraction, periorbital edema, proptosis are absent.

*Respiratory system:* on percussion – resonance percussion sound above both lungs, pulmonary below scapula angles from both sides, on auscultation– decreased vesicular breathing, wheezing in inferior parts of both sides of lungs. RR= 20 /min.

*Cardiovascular system:* heart borders extended to the left on 4 cm of midclavicular line, HR =65bpm, regular. Ps= 65 bpm. No pulse deficiency. Auscultation of the heart - heart sounds heart tones are rhythmic, clear. BP dextr = 135/80 mm Hg, BP sin = 143/88 mm Hg, (on the background of antihypertensive therapy).

*Gastrointestinal system:* abdomen is symmetrical, soft, painless, no discrepancies of the abdominal muscles. No visible peristalsis. Liver edge is smooth, painless, palpated 1.5 cm below the costal arch. Spleen and pancreas are not palpable.

*Pasternatskiy sign* is negative on both sides. Urination is free, painless

### REFERRAL DIAGNOSIS

Chronic bronchitis. Essential arterial hypertension. Heart failure. Autoimmune thyroiditis. Systemic atherosclerosis. Obesity.

### RESULTS OF LABORATORY AND INSTRUMENTAL DIAGNOSIS

*Complete blood count):* normal.

*Urinalysis:* normal.

*Biochemical analysis:* all parameters within the normal range.

*Thyroid-stimulating hormone (TSH):* normal.

*Fasting glucose test:* normal.

*Blood lipid spectrum:* normal.

*Spirometry:* ventilation lung function is not impaired.

*Electrocardiography (ECG)* signs of left ventricular hypertrophy.

### RECOMMENDATIONS FOR FURTHER EXAMINATION

Spirometry with bronchodilator test (during stable stage); blood gases (PaO<sub>2</sub>, PaCO<sub>2</sub>);

sputum culture; α – Antitrypsin; T4, T3, Anti-TPO; biochemical blood test (liver (ALT, AST, AP) and renal function tests (BUN); coagulogram; blood electrolytes (K, Na); chest X-Ray; ultrasound of thyroid gland and abdomen; consultation of an endocrinologist; 24 h -ambulatory ECG monitoring.

### CLINICAL DIAGNOSIS

**Main:** Chronic obstructive pulmonary disease (COPD).Chronic diffuses bronchitis in remission stage, condition after right-sided bilobectomy (1970) about congenital bronchiectasis. Pulmonary fibrosis.Essential arterial hypertension stage III, 2 grade.Hypertensive heart (LVH).Heart failure with preserved ejection fraction II FC, stage B.Systemic atherosclerosis (atherosclerosis of the aorta and aortic valves, dyslipidemia II atype after Fredrickson).Very high added total CV risk.

**Comorbidity:** Osteohondrosis of cervical spine in a stage of unstable remission.Deforming osteoarthritis with the lesions of the small joints of the feet, hands. Insufficiency of joint function 2st., Ro 1–2st. Postmenopausal osteoporosis.

Angiopathy of the retina in both eyes. Myopia initial stage.Autoimmune thyroiditis, diffuse goiter focal 1 degree.Euthyroidism (2015). Peptic ulcer of duodenum, state after upper gastrointestinal bleeding 2 st. (2002).

### PATIENT'S MEDICAL TREATMENT FOR LAST 6 MONTH

Salbutamol 100 mcg (Ventolin inhaler) 3–4 time per day

Valsartan 80 mg per day (does not take regularly).

Atorvastatin 10 mg (does not take regularly).

Aspirin 75 mg per day.

### OUR RECOMMENDED TREATMENT ACCORDING LAST GUIDELINES

Non-pharmacologic:recommendations to maintain healthy lifestyle, decrease sodium intake, lipid lowering diet, increase contains of milk and sea fish in diet, aerobic non strenuous exercises; infection control (flu vaccination, pneumococcal vaccination); pulmonology rehabilitation.

Treatment strategy:Tiotropium 18 mcg (Spiriva Handihaler) 1 time per day for a long time; Salbutamol 100 mcg(Ventolin Inhaler) 3–4 time and when necessary; Lisinopril 10 mg in

the morning under blood pressure control; Aspirin 75 mg once daily continuously; Rosuvastatin 20 mg in the evening; Calcium carbonate 1000 mg with vitamin D 800 mg 1 time per day in winter season; repeat spirometry after 3 months; repeat visit to pulmonologist, endocrinologist after 3 months; exacerbation: oxygen (target saturation of 88–92 %) or systemic corticosteroids (40 mg prednisone per day for 5 days).

## **PROGNOSIS**

*Prognosis for life* – in case of not following doctor's prescriptions – non-satisfactory

*The prognosis for recovery* – an unfavorable

## **PREVENTION**

Secondary prevention of exacerbations of COPD include lifestyle modification; flu vaccination; pneumococcal vaccination; good blood pressure control, decrease sodium intake, lipid lowering diet, aerobic non strenuous exercises; control of fluid balance and checkup for decompensation of heart failure; control of compliance to our medical recommendations.

## **DISCUSSION**

According to recent studies patients with complete resection of a localized bronchiectasis had better outcomes than those with incomplete resection. Regarding symptoms, the results of

surgery can be considered satisfactory. More than 84 % of patients had relieved their preoperative symptoms. These results are similar to other cases [1, 3, 7–8, 13–14, 16–17].

The extent of compensatory lung growth in humans following lobectomy is incompletely investigated; a number of long-term physiological studies suggest, however, that some degree of compensatory growth may occur, especially in children [18–21].

Our clinical case shows recovery of parameters of external respiration function in patient after 40 years which requires further control.

In addition, our patient needs correction of the treatment of AH and more accurate diagnosis (and treatment) of thyroid disorder and first of all, modification of the lifestyle and reconsideration of the regularity of taking medicines.

## **CONCLUSION**

This article exhibits a case of congenital bronchiectasis with bilobectomy and the subsequent restoration of the function of external respiration.

Despite of compensatory possibilities of lungs of external respiration function is not enough for compensation of lost lung volume and the patient must be considered as a whole.

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