

EFFECTIVENESS OF PHOTODYNAMIC THERAPY OF A PATIENT WITH EARLY CENTRAL LUNG CANCER AND CYSTIC FIBROSIS

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Abstract

The authors describe a clinical observation with full clinical effect after multi-course photodynamic therapy of a patient with central lung cancer and cystic fibrosis using Photoditazine. Photoditazine was administered intravenously at a dose of 0.8 mg/kg 2 hours before the irradiation session. Irradiation parameters: power density – 150 mW/cm², energy density – 200 J/cm². In total, 3 courses of photodynamic therapy were performed. As a result of the treatment, a complete regression of the tumor was noted. The patient has been under dynamic observation for 2 years after treatment, no relapse was observed.

Keywords: photodynamic therapy, photoditazine, central lung cancer, cystic fibrosis.

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ЭФФЕКТИВНОСТЬ ФОТОДИНАМИЧЕСКОЙ ТЕРАПИИ БОЛЬНОЙ РАННИМ ЦЕНТРАЛЬНЫМ РАКОМ ЛЁГКОГО И МУКОВИСЦИДОЗОМ

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Резюме

Авторы описывают клиническое наблюдение с полным клиническим эффектом после многокурсовой фотодинамической терапии больной центральной раком легких и муковисцидозом с использованием фотодитазина. Фотодитазин вводили внутривенно в дозе 0,8 мг/кг за 2 ч до проведения сеанса облучения. Параметры облучения: плотность мощности – 150 мВт/см², плотность энергии – 200 Дж/см². Всего было проведено 3 курса фотодинамической терапии. В результате проведенного лечения отмечена полная регрессия опухоли. Пациентка находится под динамическим наблюдением в течение 2 лет после лечения, рецидива не выявлено.

Ключевые слова: фотодинамическая терапия, фотодитазин, центральный рак лёгкого, муковисцидоз.

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Introduction

According to world statistics, one of the leading places in the structure of the incidence of malignant diseases is occupied by tumors of the broncho-pulmonary systems. Only in 2017 in Russia malignant tumors of these localizations were diagnosed in more than 62 thousand patients [1].

Currently, one of the endoscopic treatments for carcinoma in situ of central lung cancer (CLC) is photodynamic therapy (PDT). PDT shows high efficiency with a minimum of complications, which is especially important in the treatment of patients with severe concomitant pathology [2–5], which, among other things, includes some genetic diseases.

One of these diseases is cystic fibrosis, a systemic hereditary disease caused by a mutation in the transmembrane regulator of cystic fibrosis gene and characterized by damage to the glands of external secretion, as well as severe disturbances in the functioning of the respiratory and gastrointestinal tract. The total number of adult patients with cystic fibrosis in Russia annually is about 3.5 thousand people with a total incidence of the disease of 1/100 thousand of the population [6]. It has been proven that mutations of the transmembrane conductivity regulator (CFTR) causing cystic fibrosis are associated with a high risk of various types of cancer, especially malignant lung tumors [7].

The following is a clinical example of the effectiveness of PDT in a patient with central lung cancer and cystic fibrosis.

Patient K., age 47 years old, has been observed since 2006 at the Scientific Medical Center «Family Doctor» of the Amur State Medical Academy (SMC) with the main diagnosis: cystic fibrosis, mixed form of the disease. Concomitant diseases: chronic broncho-obstructive bronchitis, moderate; respiratory failure of 2 severity; secondary pulmonary emphysema; chronic pulmonary heart, etc. The diagnosis was established on the basis of an in-depth examination of the patient and a number of studies (studying the clinical symptoms of the disease, parameters of bronchial obstruction, genetic examination, bronchoscopy, computed tomography, morphological studies). The patient received pathogenetic and symptomatic therapy for cystic fibrosis and concomitant pathology. Every year, the general condition of the patient worsened, despite the prescribed treatment.

In 2016, with a planned treatment and diagnostic bronchoscopy, the patient found carcinoma in situ spurs of the upper lobar bronchus on the right, a tumor measuring 0.6 cm × 0.2 cm (Fig. 1a). Conducted a morphological study of the biopsy. Preinvasive carcinoma was verified. To determine the further tactics of treatment for the patient by the medical commission of the SMC, a decision was made on the need for consultation with leading specialists of the First Moscow State Medical University named after I.M. Sechenov Ministry of Health of Russia and the MRRC them. A.F. Tsyba - a branch of the Federal State Budgetary Institution Scientific Research Center for Radiology of the Ministry of Health of Russia: a decision was made collectively to conduct PDT, due to

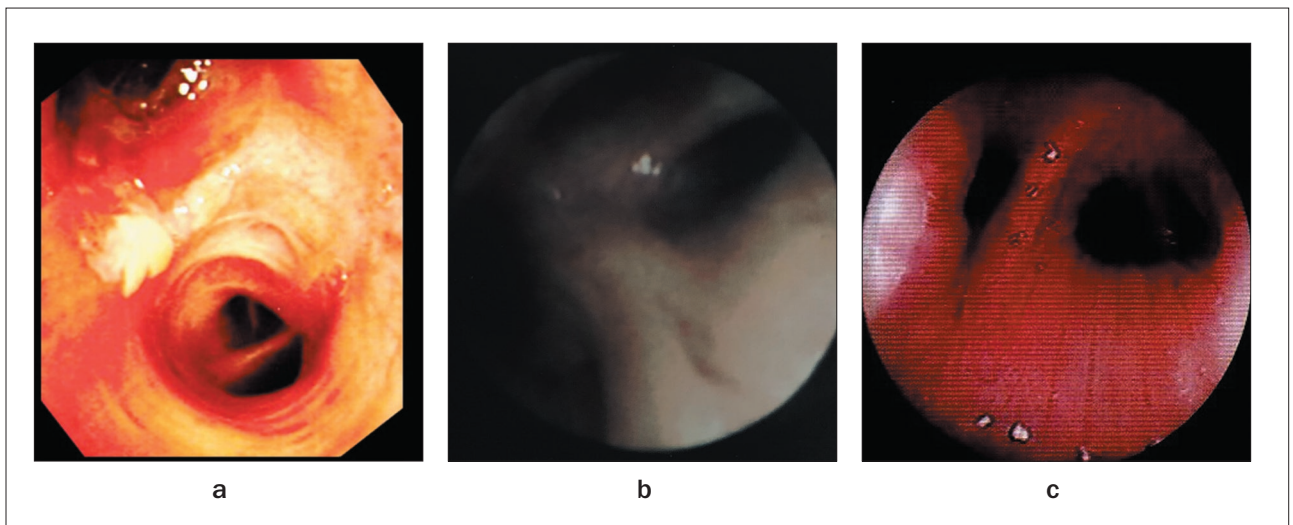


Рис. 1. Результаты бронхоскопии:

- a – до ФДТ;
- b – через 6 мес после ФДТ;
- c – через 24 мес после ФДТ

Fig. 1. Bronchoscopy results:

- a – before PDT;
- b – 6 months after PDT;
- c – 24 months after PDT

the fact that the generally accepted methods of treating CRL were contraindicated due to the severity of bronchial obstruction, hypoxemia, and the risk of unwanted adverse reactions to chemoradiotherapy.

A PDT session was performed 2 hours after intravenous, drip administration of photoditazine (VETA-GRAND LLC, Russia, registration certificate No. LS 001246 of 05/18/2012) at a dose of 0.8 mg / kg body weight. A quartz fiber with a cylindrical diffuser at a distance of 1 mm from the neoplasm was introduced through the instrument channel of the endoscope. 2 hours after the introduction of the photosensitizer, a PDT session was performed on a Crystal apparatus with a radiation wavelength of 662 nm (R&D Center Technika-PRO, Russia). The laser power density was 150 mW/cm², and the energy density was 200 J/cm². In total, the patient underwent 3 courses of PDT: the second one 1 week after the first, the third one 1 month later.

During the first week after PDT, the patient retained a slight pain syndrome in the irradiated area, which was stopped by taking analgesics. Eight days after PDT, during the follow-up sanitation bronchoscopy, necrosis of the neoplasm with fibrinous deposits, hyperemia and edema of the surrounding mucous membrane were revealed. There were no other complications during treatment.

When bronchoscopy performed after 6 months (Fig. 1b) and 2 years after the treatment, relapse was not detected.

Conclusion

The presented clinical observation shows the effectiveness of PDT in a patient with severe combined pathology - central lung cancer and cystic fibrosis. Thus, photodynamic therapy has great potential for use in patients with severe concomitant pathology as an effective and safe method for the treatment of central lung cancer.

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