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Case Report Open Access

Transthoracic Lung Ultrasonography as a Tool of Alpha-1-Antitripsine Deficiency Assessment

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Abstract

A case refers to a patient with a diagnosis of alpha 1 antitrypsin deficiency and chronic obstructive pulmonary disease. Performed Transthoracic Lung Ultrasound (TLU) examination revealed the presence of artifacts Am lines that are the result of bullae, confirmed by computed tomography of the chest. This is the first case in which first revealed the presence of the Am.

Keywords: Transthoracic Lung Ultrasound; Antitrypsin; Chronic obstructive; Computed tomography

Introduction

TLU is a non-i0nvasive diagnostic method Possessing validation and allowing for the diagnosis of many lung diseases [1]. However, there is no data in the literature on the use of ultrasound in patients with emphysema. The incidence of emphysema is high, according to data from 2008 among Americans, it was 16.8 per 1000 [2]. The following case presents new diagnostic possibilities on the example of emphysema patients with alpha-1 antitrypsin deficiency.

Case Report

A 45 years old woman with a diagnosed Alpha-1-Antitripsine Deficiency (AAT deficiency), emphysema and severe COPD was admitted to the Department of Pneumonology of Medical University of Gdańsk, Poland with signs and symptoms of exacerbation in 2005. AAT deficiency was determined using genetic tests (Phenotype PiZ, Genotype PiZZ) and measuring the level of plasma alpha-1-antitripsine (4.1 microM/L with the reference value of 32.4 microM/L). In the medical history, the patient reported an effort dyspnea, transient dyspnea at rest and recurring respiratory tract infections over the last year. Physical examination revealed an exacerbated alveolar murmur over the lungs with prolonged expiration, whistles and dry rales with an increased number of breaths (approximately 24/min). Spirometry showed FEV-1 - 30%, VC - 92% of predictive value and FEV1/FVC - 41% (actual value). In the bodypletysmography assessment TLC was 184%, RV - 407%, FRC - 140% of predictive value. Echocardiography revealed diastolic heart failure and pulmonary hypertension with PAP (Pulmonary Arterial Pressure)=45 mmHg. The chest High Resolution Computer Tomography (HRCT) revealed the features of massive panlobular emphysyma in the lower lobes of the both lungs, with significant reduction of the vessel markings along with the features of irregular accumulation of the air (Figure 1). During the hospitalization, the patient has undergone a transthoracic ultrasound examination of the lungs on which decreased respiratory mobility of the lungs as well as many horizontal artifacts were noticed. Because of the unique morphology of these horizontal artifacts, we called them Am line. The localization of those artifacts was related to the emphysematous areas of the lungs seen during the chest HRCT examination. In the case of the patient with diagnosed emphysema, the Am line artifact presents itself as many horizontal lines, densely situated below pleural line, going to the edge of the screen at regular intervals, narrow at the top and wide at the bottom of the screen

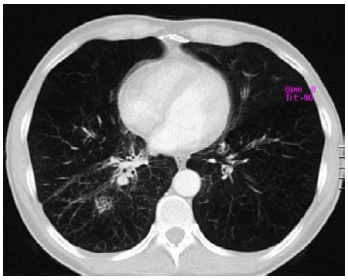

Figure 1: A CT scan: Panlobularis emphysema in patient with alpha-1-antitripsine deficiency (transverse projection).

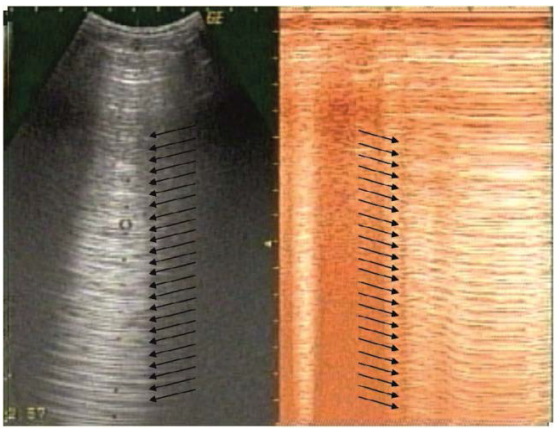

Figure 2: Am line in *B mode* presentation (many horizontal lines, densely situated below pleural line, going to the bottom of the screen at regular intervals); B-2: Am line in *M - mode* presentation.

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(Figure 2). The artifact of Am line has not been described yet. It seems that the presence of this artifact in the lower fragments of the lungs along with a decreased respiratory mobility of the lungs may suggest emphysema.

Discusion

Image diagnosis of the emphysematous changes in the lungs nowadays is based on the x-ray examination, whereas the golden standard of the assessment is HRCT [3-5]. The typical ultrasound image of the lungs that would correspond with the emphysema has not been described in any publication previously [6]. The unique morphology of Am line with localization seems to be compatible rather with the result of HRCT examination, then coincidental artifact. The ultrasound examination of the lungs is becoming a promising diagnostic tool. It is essential to continue investigation on the larger group of patients with alpha-1-antirtipsine deficiency and sever emphysema in order to determine exact sensitivity as well as specificity of the ultrasound symptom described above.

The Alpha-1-Antitripsine Deficiency (AATD) is strong genetic risk factor of the chronic obstructive pulmonary disease (COPD) [7,8]. Commonly HRCT is required to diagnose and monitor the level of emphysema [9-11]. An easy approach, which is a pulmonary ultrasound evaluation to select patients requiring molecular diagnosis and to follow the deterioration of emphysema could be a valuable tool for further diagnostic procedures [11,12].

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