Case Report

Improvement in image quality of Tc-99m-based ventilation/perfusion single-photon emission computed tomography in patients with chronic obstructive pulmonary disease through pretest continuous positive airway pressure treatment

ABSTRACT
Ventilation/perfusion single-photon emission computed tomography performed using an aerosol of carbon-coated technetium is frequently used for diagnosing pulmonary embolism. Certain patients may suffer from chronic obstructive pulmonary disease (COPD); for such patients, the formation of mucus clots in airways can cause accumulation of the aerosol in the larger airways. This centralized deposition of the aerosol leads to insufficient activity in peripheral lung segments and subsequently results in ventilation images of substandard or even nondiagnostic quality. Continuous positive airway pressure (CPAP) therapy improves airway dynamics and quality of life for COPD patients. We report for the first time the results for two patients for whom initial ventilation scans were of insufficient quality, but diagnostic-quality images were obtained after CPAP therapy.

Keywords: Chronic obstructive pulmonary disease (MeSH), continuous positive airway pressure ventilation (MeSH), emission-computed, pulmonary embolism/diagnostic imaging (MeSH), single-photon (MeSH), tomography

INTRODUCTION AND CASE REPORT
Pulmonary embolism is a potentially life-threatening and common condition with a clinical symptomatology that makes it difficult to distinguish from other pulmonary or cardiac diseases. Imaging techniques such as ventilation/perfusion single-photon emission computed tomography/computed tomography (SPECT/CT) are therefore pivotal in the diagnosis of this condition.[1,2] In patients with severe chronic obstructive pulmonary disease (COPD), the image quality produced by SPECT is often of substandard or even nondiagnostic quality. These patients exhibit increased mucus production that results in accumulation of the radioactive tracer in “hot spots” when ventilation imaging is performed through inhalation of a carbon-coated technetium aerosol.[3,4] Continuous positive airway pressure (CPAP) physiotherapy is frequently used for COPD patients to assist with mucus mobilization.[5] We present two cases [Figures 1 and 2] in which pretest CPAP reduced deposition of the tracer in central airways, thereby improving imaging quality. This approach could particularly benefit patients for whom other imaging modalities, such

JENS PEDER DREYER PALUDAN, SVEN ROBERT ANDRESEN, JAN ABRAHAMSSEN, LARS JELSTRUP PETERSEN, CHRISTIAN HOYER
Department of Clinical Physiology, Viborg Regional Hospital, Viborg, and Department of Nuclear Medicine, Aalborg University Hospital, Aalborg, Denmark

Address for correspondence: Jens Peder Dreyer Paludan, Department of Clinical Physiology, Viborg Regional Hospital, Heibergs Allé 4, DK-8800 Viborg, Denmark.
E-mail: jens.paludan@midt.rm.dk

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

as CT angiography, are not an option. This method has not previously been described in the literature.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES