

137 Sleep disturbances in CF children: looking for severity predictors
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Sleep disorders are common in CF patients. Pediatric studies are contradictory. Being aware of the incidence of respiratory sleep disturbance (RSD) and clinical and respiratory function predictive factors is essential. We aimed to identify sleep disturbances in CF children and determine associated spirometric indices as severity predictors.

In-lab polysomnography (PSG) followed by spirometry was carried out in CF children, 6 to 18 y. Baseline SpO₂ was assessed. A questionnaire was applied. Descriptive statistics and comparative tests were performed. Significance level was set at 5%.

Thirty-three subjects were included [16 males (48.5%); median age 12 y (6–18); average BMI z-score -0.35 (dp 0.78)]. 29 patients (87.9%) had sleep quality and/or RSD complaints. Sleep efficiency was reduced and sleep latency and wake after sleep increased. N1, N2, N3, REM and awakenings were normal. The A/HI was 0.6/h (dp 0.9); mean RDI: 6.6 (dp 5.2). Mean wake SpO₂ [97% (dp 1.1)] and sleep SpO₂ [95% (dp 2.7)] were normal; mean ODI was 2.36; minSpO₂ was 89% (dp 4.1). TeCO₂ was normal. 51.5% of patients had nocturnal cough. There was a statistically significant difference between the waking and sleep SpO₂ ($r=0.326$, $p=0.064$). FEV₁ was associated with sleep SpO₂ ($r=0.528$, $p=0.002$). PSG data significantly correlate with the questionnaire for night awakenings and wake after sleep ($p=0.985$) and difficulty breathing during sleep and RDI ($p=0.722$).

Most children had sleep complaints. The subjective assessment of sleep correlates with PSG findings. These mild respiratory disease children had scarce nocturnal SpO₂ events, associated with disease severity assessed by spirometry. The association between SpO₂ awake and mean sleep SpO₂ indicates a possible risk predictor for nocturnal desaturation.

138 Depiction of anatomic structures of relevance for scoring of cystic fibrosis changes by chest tomosynthesis and computed tomography

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Introduction: Chest radiography (CR) and computed tomography (CT) are commonly used for imaging of patients with cystic fibrosis, and scoring is applied to assess disease severity. Chest tomosynthesis (CTS) is a new imaging modality providing better anatomic visualization than CR at radiation doses and costs lower than CT.

Objective: To compare visibility and size of anatomic structures of relevance for scoring in CTS and CT images.

Methods: 21 adult patients with cystic fibrosis were examined both with CTS (VolumeRAD; GE Healthcare) and volumetric CT (LightSpeed Pro 16, LightSpeed VCT, Discovery CT750HD; GE healthcare and Somatom Definition, Siemens Medical Solutions). The average effective dose for a standard patient was 0.13 and 4.5 mSv for CTS and CT, respectively. Comparison of visibility and manual measurements of diameters of the central and peripheral bronchi and their accompanying artery, as well as bronchial wall thickness (BWT), were performed in a non-blinded fashion.

Results: All central structures could be evaluated. Mean difference in diameter of central bronchi, accompanying artery and BWT between CTS and CT was -0.6 (SD 0.6), -0.7 (SD 0.7) and -0.4 (SD 0.2) mm, respectively. Peripheral structures were more difficult to assess by CTS. Peripheral bronchial diameter, BWT and diameter of accompanying artery could be assessed by CTS in 20, 15 and 4 cases, respectively and mean difference between measurements was -0.5 (SD 0.5), -0.3 (SD 0.3) and -0.4 (SD 0.4) mm, respectively.

Conclusion: This study indicates that peripheral structures are more difficult to evaluate by CTS and that CTS slightly underestimate size of structures in comparison to CT.

139 Respiratory motion suppression for three-dimensional, high isotropic spatial resolution, magnetic resonance imaging of the lung without contrast agent injection

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Objectives: X-ray and CT repetition during a CF patient life may become problematic because of the cumulative radiation dose. Magnetic resonance imaging (MRI) of the lungs might be a promising alternative to CT. However technical issues such as the long acquisition times required by MRI compared to CT create challenges. Long breath hold durations, needed to avoid motion corruption of the images, may be difficult to achieve for CF patients; resulting in limited diagnostic information. We introduce a method to reconstruct image volumes for multiple phases of the respiratory cycle using a single acquisition during free breathing.

Methods: A balanced Steady State Free Precession 3D radial sequence was acquired in an interleaved fashion using ECG triggering to obtain diastolic cardiac motion suppressed radial projections in k-space. The signal related to respiratory motion was extracted from the first projection, acquired along the superior-inferior direction, of each interleave. Using this signal, the interleaves acquired during user-selected phases of the respiratory cycle were identified and used for image reconstruction. This sequence was tested in volunteers and in a CF patient and compared with the breath hold 3D gradient echo sequence used in clinical routine.

Results: The new technique allowed visualization of the pulmonary vasculature until a segmental level without contrast agent use. Rough parenchymal and bronchial abnormalities were assessed as well as hypertrophied systemic arteries.

Conclusion: The free breathing sequence with its high isotropic spatial resolution (1.3 mm³) and high intrinsic blood–parenchyma contrast shows promise for examination of CF patients.

140 Is bronchoalveolar lavage necessary for monitoring and treating respiratory infections in children with cystic fibrosis?

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Rationale: Chronic infection and inflammation plays a central role in CF lung disease. Bronchoalveolar lavage (BAL) is considered the gold standard for defining airway microbiology in children. While many units routinely perform BAL in children with CF, in our hospital it is done only when a child has surgery for other reasons.

Objectives: To identify children who have undergone BAL and compare culture results from BAL with cough swabs/sputum cultures.

Methods: Children were identified retrospectively, using surgical lists. Culture and BAL results were checked using annual review summaries and pathology records.

Results: 20 children underwent BAL between 2011–2013; of these 19 had results available. Mean time to culture results was 6 days for standard organisms however *Mycobacterium* culture took significantly longer. 6 children had new organisms identified on BAL, however 4 of these were atypical bacteria of uncertain significance. 7 children grew organisms which had already been identified on cough swabs, 6 had negative cultures. 2 children grew organisms on recent cough swabs that were not grown from BAL.

Conclusions: BAL is a useful tool to help identify respiratory infection in children with CF. It can identify organisms not picked up using non-invasive methods, however false negative results are also possible. Some organisms cultured were extremely rare and of questionable clinical significance. The technique has several limitations: it is invasive, costly, requires time and resources as well as risks associated with general anaesthesia. Routine use when a child would not otherwise be undergoing anaesthetic could not be justified based on our results.