What Pulmonary Assessment Should We Do, and When Should We Do It?

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Disclosures

• Pediatric Pulmonary section editor, UpToDate
Why do a test?

• Assess:
  – the Mechanisms of disease; how much does each play a role in a particular patient?
  – Impact of the deformity on lung function at initial presentation
  – Presence of co-morbid conditions, e.g. asthma, neuromuscular weakness, pulmonary hypoplasia
  – Impact of serial treatments for the deformity
  – Risk of cardiopulmonary complications post-op
<table>
<thead>
<tr>
<th>FUNCTIONAL FEATURES</th>
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<td>Low lung volumes:</td>
<td>CT imaging and PFT’s</td>
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<td>Stiff chest walls:</td>
<td>Compliance measures in the OR</td>
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<td>Diaphragm excursion:</td>
<td>Dynamic MRI’s</td>
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<td>Respiratory muscle strength and endurance:</td>
<td>PFT’s (MIP/MEP)</td>
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<th>FUNCTIONAL OUTCOMES</th>
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<td>Exercise tolerance:</td>
<td>6-minute walk, VO2</td>
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<td>Sleep quality:</td>
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<td>Weight velocity:</td>
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<td>Quality of Life in some domains</td>
<td>EOS survey</td>
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What does Vital Capacity mean?

- It is an integrated measure of multiple pathologic pulmonary processes.
- It has to be normalized for post-natal growth and correlates best with height in normal children.
Poor Correlations Between Lung Function and Cobb Angle: Use together in treatment decisions and monitoring.

Seattle-Philadelphia-San Antonio: Initial FVC*  

CSSG Registry: 54% of 3,968 patients > 5 years old at presentation
Pulmonary Exam in EOS for < 5 Year Old Children

• Respiratory rate (age specific norms)
• Asymmetry of breath sounds
• Asymmetric timing of breath sounds
• Abdominal muscle use in expiration
• Intercostal & suprasternal retractions
• Muscle tone/spasticity
• Chest radiograph: flattened diaphragms, low lung volumes
16% Reduction Over 6 Years

Suggestions To Consider

• Measure lung function early and often. Progressive deformity can be described in functional terms as well as structural changes.

• Use functional measures in parallel with orthopedic findings to make treatment decisions.

• Keep mechanistic measures and outcome measures separate but of equal importance.
FVC: Compared to What?

- How does reduced FVC relate to 6 minute walk?
- At what FVC does sleep become compromised?
- What FVC leads to increased hospital surgical morbidity?
- What FVC at what age predicts early mortality in adulthood?