Obstructive Lung Disease in Patients with Congenital and Syndromic Scoliosis

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Is Scoliosis Associated with Airway Disease?

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Obstructive Lung DZ

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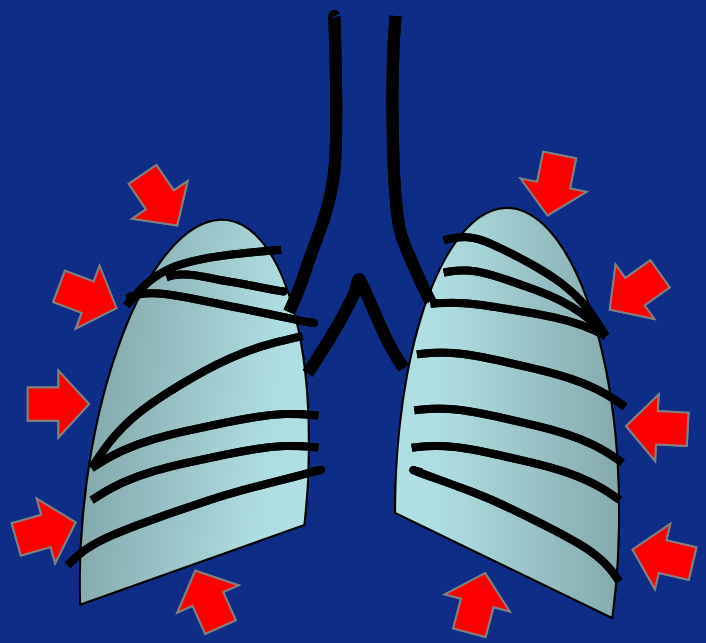
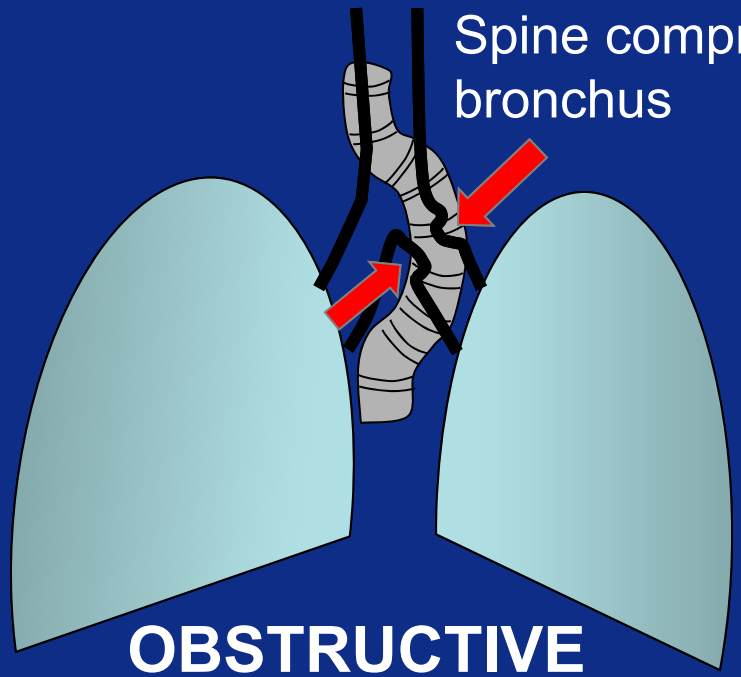
↓ FVC



RESTRICTIVE
(Small lung cage restricting lung capacity)

↓ FEV1/FVC

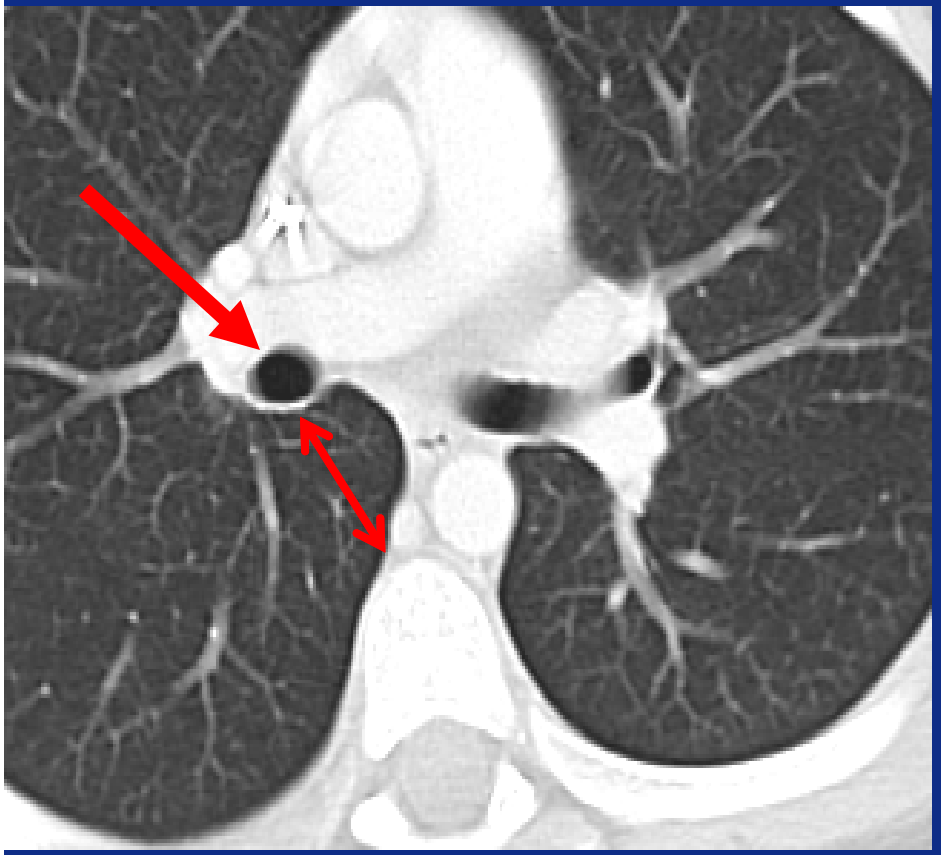


OBSTRUCTIVE
(Normal size lungs, but partial bronchus obstruction)

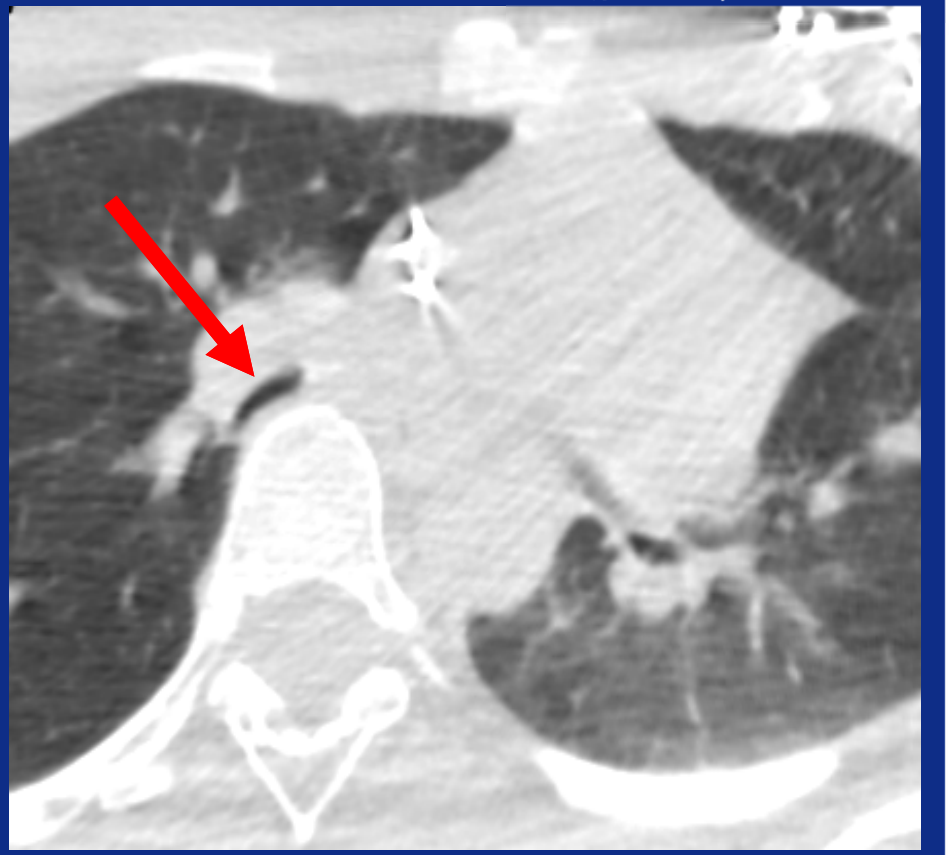
Obstructive Lung Disease (airways obstruction)

- Airways disease
  - Asthma
  - Cystic fibrosis
  - Airway compression

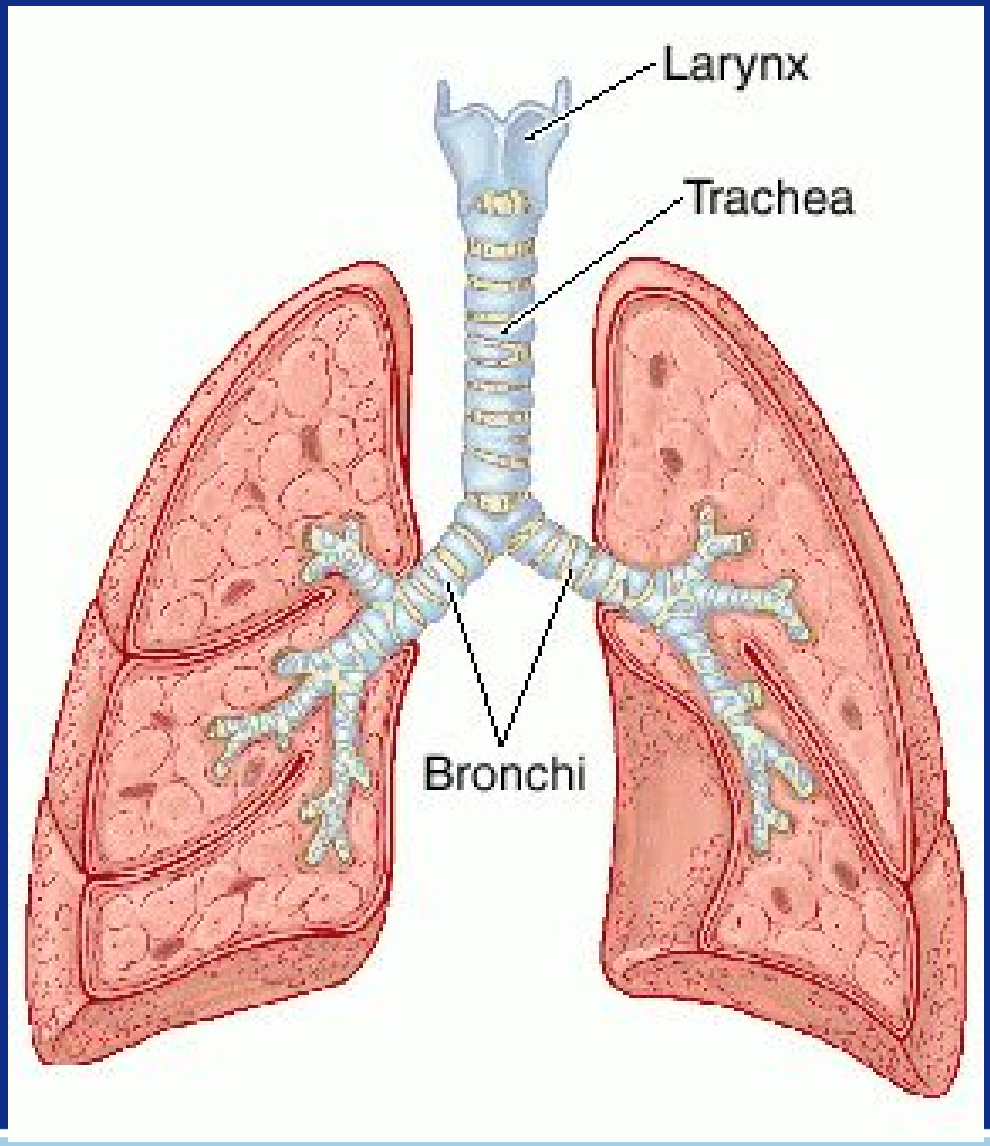
- Difficulty exhaling gas quickly from the lungs due to obstructed airways (air does not come out fast)



Normal bronchus remote from spine



Obstructed bronchus compressed over spine



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http://www.volny.cz/martinam/im.v/trachea.jpg

Cincinnati Children's Data 2004-2009

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Inclusion Criteria

- Congenital or Syndromic Scoliosis
- Cobb angle ≥ 40°
- Pre-operative Pulmonary Function Testing

Exclusion Criteria

- Asthma
- Cystic Fibrosis
- Airway anomalies

Methods

- Queried local database for patients with scoliosis X-rays and Pulmonary Function Testing from 2004-2009
- Reviewed Pulmonary Function Testing for all patients with Congenital or Syndromic Scoliosis and Cobb angles $\geq$ 40 degrees

Methods

- Defined Obstructive Lung Disease per consensus American Thoracic Society criteria (FEV_1/FVC ratio below the 95% confidence interval)
- Prevalence of Obstructive Lung Disease in a reference population using this definition is 2.5%

Results

- N = 26 patients
- Syndromic diagnoses included:
  - NF-1
  - Marfan Syndrome
  - Klippel-Feil
  - Schwachmann-Diamond Syndrome
  - Diastrophic Dysplasia

Results

- Median age at scoliosis diagnosis: 11 years
- Median primary Cobb angle: 55 degrees

Results

- Prevalence of Obstructive Lung Disease (airway disease) was 27% (7/26)
- Prevalence of Restrictive Lung Disease (small lung volume) was 53% (14/26)

Is a Mechanism of the Obstructive Lung Disease (OLD) Large Airway Compression?

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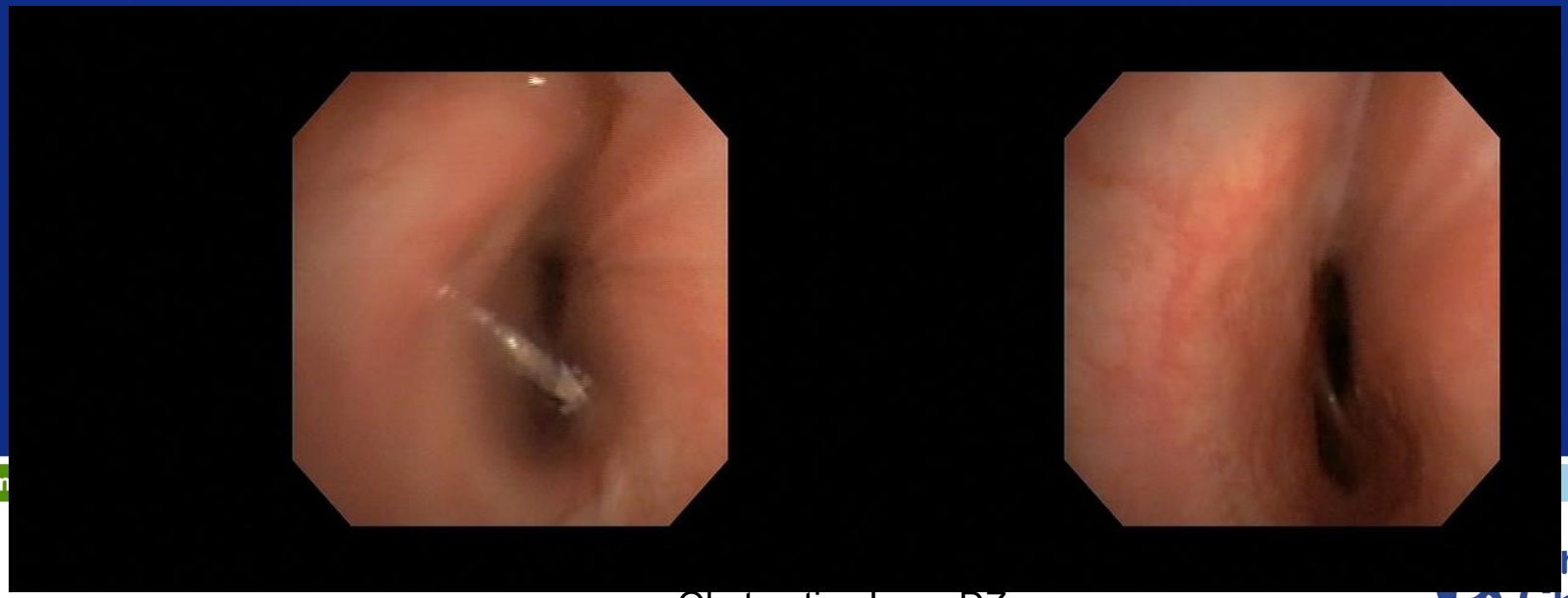
Methods

- 5 of 7 patients with OLD had flexible bronchoscopy and CT scan evaluations
- Flexible bronchoscopy reports and videos were reviewed to define the anatomy of the trachea and mainstem bronchi
- CT scans were reviewed to compare large airway findings on CT with large airway findings on flexible bronchoscopy

Findings-Bronchoscopy

- Each of the 5 bronchoscopies revealed mainstem bronchial compression from the posterior airway wall on the side of the major spinal curve



Findings-Chest CT

- Patients with right-sided major curves had compression of the right mainstem bronchus between the spine (posterior) and the right pulmonary artery (anterior).

- Patients with left-sided major curves had compression of the left mainstem bronchus between the spine (posterior) or descending aorta (posterior) and left (anterior)

Conclusions

- Obstructive lung disease (airway disease) is common in children with Congenital or Syndromic scoliosis who have a Cobb angle ≥ 40°
- Airway compression from lordoscoliosis a common possible mechanism for this finding

Thank you

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